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AN ESSAY ON COIN.

By BRYAN ROBINSON, M. D.

LONDON:
Printed for W. JOHNSTON, in St.
Paul's Church-Yard, 1758.

To the REVEREND

Doctor *ECHLIN*.

SIR,

THE Diſtreſs of this Nation, for many Years, under a very confuſed State of the COIN, engaged our dear Father's Thoughts in that Subject, at ſome of his Hours of Relaxation from ſeverer Studies: And the Reſult of his Inquiries upon the Occaſion, is contained in the following Sheets, which he was prevented by Death from publiſhing, as he intended.

From a Knowledge of the high and juſt Opinion which he entertained of your Abilities and Learning, and from a deep Senſe of the Value which he ſet upon your long and uninterrupted Friendſhip with him; We are convinced, that a Publication of this ESSAY addreſſed to you, will be the moſt faithful Diſcharge of our Duty towards It: And therefore, We entreat you to receive It, as a Work of your deceaſed Friend, under the Diſadvantages of wanting his laſt Hand, the Fate which attends poſthumous Pieces!

And permit us, Sir, farther to requeſt, that, in Addition to the Obligations we are already under, you will accept It from us, as a Pledge of our Father's Reſpect, Eſteem and ſincere Affection, for you, continued in,

Dear Sir,

Your moſt obedient,

and moſt humble Servants,

Christopher Robinson.

Robert Robinson.

Dublin, *Oct.*
22, 1757.

ERRATA.

The Reader is deſired to correct the following Miſtakes of the Preſs.

P. 7, *read* line 1 *thus*, or greater; for the Quantity &c.

P. 7. Line 4, *for* . *read* ;

P. 7, *read* Line 15 *thus*, the Rich Man who has much; unleſs the Rich Man's Demand for Money to anſwer his large Expences, be the ſame with Reſpect to his Riches, as the poor Man's Demand for Money to anſwer his ſmall Expences, is with Reſpect to his ſmall Fortune; in which Caſe the ſame Quantity of Money will be equally valuable to both: But otherwiſe, if a &c.

P. 8,

ERRATA.

P. 8, *read* the End of the Note *thus*, that; *without ſuch a Proportion*, MONEY, *which the common Conſent and Convenience of Mankind have made the* MEASURE *of the Value of Things, and therefore, of Neceſſity*, INVARIABLE *to Perſons of all Ranks and Conditions in Life, muſt fail, in Fact, to be a* JUST *one.*

P. 12, *read* Line 13 *thus*, the Value of the Commodity, when its Quantity and Goodneſs are given, as we ſuppoſe them to be when we talk of the Prices of Commodities, is &c.

P. 62, Line 11, for *Revenue*, read TREASURY.

AN

AN
ESSAY
ON
COIN*.

IN this Eſſay on COIN, I ſhall obſerve the following Method. *Firſt*, I ſhall ſhew, how to meaſure the Value of a Commodity; *Secondly*, how to determine its Price in Silver and Gold; *Thirdly*,

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* The Copy, from which this ESSAY is printed, was made by the AUTHOR in *January* 1747; and it is the laſt perfect one which he left. In *November* 1750, he began another Copy; but proceeded no farther than a few Pages in the two firſt Propoſitions. The only Variation, any way material, relates to the

how to determine the Value of any Weight of *fine* Gold in Proportion to the Value of the ſame Weight of *fine* Silver; *Fourthly*, how to determine the Fineneſs of *Allayed* Gold or *Allayed* Silver, both from its ſpecific Gravity, and its Aſſay; *Fifthly*, how to determine the *Engliſh* Values of *Foreign* Gold and Silver Coins; and *Sixthly*, I ſhall conclude with a Repreſentation of Sir ISAAC NEWTON's concerning Coin.

FIRST, I ſhall ſhew how to meaſure the Value of a Commodity.

PROPOSITION I.

In moſt Things, the Value of a Commodity is meaſured by its Quantity, Goodneſs, Scarcity, and the Demand for it, taken together.

That

Value of the Guinea; and it is given hereafter, in one of the Notes. The other Notes are added by the Editor—An Intimation which, he has too great Reaſon to apprehend, will be thought unneceſſary!

That each of theſe, namely, the Quantity, Goodneſs, Scarcity and Demand, makes a Part of the Meaſure of the Value of a Commodity, appears from our Shops and Markets. And therefore the whole Meaſure of the Value of a Commodity, will be compounded of all theſe Parts, that is, will be as the Quantity, Goodneſs, Scarcity and the Demand, taken together.

In many Commodities, the Quantity is determined by Weight or Meaſure; and the Goodneſs is eſtimated by Uſefulneſs, Beauty, Fineneſs of Workmanſhip, and the like. In *Gold* and *Silver*, the Quantity of either of theſe Metals is determined by Weight; and its Goodneſs by the Quantity of fine Metal contained in that Weight. Out of theſe Metals the Coins of Nations are formed; but then the Metals out of which the Coins are formed, are not pure or perfectly fine, but are mixed with a ſmall Proportion of ſome baſer Metal, generally Copper, in order to make the Coins formed out of the

Mixture, more hard and laſting. The baſer Metal, which is called the *Allay*, is reckoned of no Value on account of the ſmall Proportion it bears to the finer Metal; and therefore the Value of any Weight of the Mixture, as far as it depends on the Weight and Fineneſs, will be meaſured by the Quantity of fine Metal contained in that Weight. The *Allayed* Gold and *Allayed* Silver of a Nation, out of which its Gold and Silver Coins are formed, is called the *Standard Gold* and *Standard Silver* of that Nation. A Troy Pound of the *Standard* Gold of *England*, contains eleven Ounces of fine Gold and one Ounce of Allay*. And the Troy Pound of the *Standard* Silver of *England*, contains eleven Ounces two Penny Weight of fine Silver, and eighteen Penny Weight of Allay. So that the Value of a Troy Pound of the *Standard* Gold of *England* is meaſured by $\frac{11}{12}$; and the Value of a Troy Pound of the *Standard* Silver of *England*

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* Or twenty-two Carrats fine, and two Carrats Allay.

England is meaſured by $\frac{11.1}{12}$. If W be any Weight of Gold or Silver of the *Engliſh Standard*, $\frac{11\,W}{12}$ will expreſs the Value of that Weight of Gold, and $\frac{11.1\,W}{12}$ the Value of that Weight of Silver. Theſe will expreſs the Values of *Engliſh* Gold and *Engliſh* Silver, when the Scarcity of theſe Metals and the Demand for them are both given; as they will be, when they are equally ſcarce and equally demanded at all Times, or when the Scarcity and Demand are reciprocally proportional to each other. For the Product of the Scarcity and Demand will be given, when each of theſe is either always the ſame; or when as one increaſes the other leſſens, that is, when they are reciprocally proportional. If s and d, expreſs the Scarcity and Demand of Gold and Silver; then s d will be given, when both s and d continue the ſame; or when s is as $\frac{1}{d}$, or d as $\frac{1}{s}$; for then $s\,d = 1$.

To make Gold or Silver valuable in Proportion to its Weight and Fineneſs, taken together, or in Proportion to the Quantity of fine Metal contained in a given Weight of either, it is neceſſary that the Demand ſhould be inverſly as the Scarcity, or directly as the Plenty; for the Scarcity and Plenty of a Thing anſwer reciprocally to one another, when it is more ſcarce it is leſs plentiful, and on the contrary.

As Gold and Silver are by the Conſent of Mankind made Meaſures of the Values of all other Commodities; ſo the Demand for Gold and Silver, or for Coins formed out of theſe Metals, ought to be proportional to the Debts contracted by Commodities purchaſed, that is, the Demand ought to be proportional to a Man's Expences: and the Scarcity, of theſe Metals, or of what can be purchaſed with them, being greater or leſs as their Plenty is leſs or greater; and their Plenty being leſs or greater, as the Quantity of Riches is leſs or greater; the Quantity of Riches is meaſured by the Quantity of theſe Metals, or of Land or other Commodities which can be purchaſed with them. The Product therefore of the Scarcity and Demand, will be as the Expences in Proportion to the Riches; which is univerſally true both in ſingle Perſons and in whole Nations. But Expences ought ever to be proportional to Riches, otherwiſe Gold and Silver cannot be juſt Meaſures of the Values of Things. Money in the Hands of a poor Man, who has but little of it, is more valuable to him, than Money is to the rich Man who has much; and therefore * if a "poor

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* THE AUTHOR here conſiders the Caſe abſtracted from the Interpoſition of Civil Laws; for which, if he had lived to publiſh this ESSAY, it was his Intention, to have corrected this and the following Paragraphs, ſo as to have made a proper Reſervation. His Opinion, upon farther Conſideration, being, "That *the Laws of civil Society, in the Contracts of* "*its Members with one another, muſt preſume the Ex-*"*pences, of the Parties contracting, to be in Proportion* "*to their Riches; and conſequently, a given Quantity.* "And that this Preſumption muſt be concluſive; "no Proof being admiſſible againſt it, on account "of the extream Difficulty and Uncertainty of "an

“ poor Man and a rich Man were to purchaſe the ſame Commodity with Money, ſuppoſe a Loaf of Bread, the rich Man ought to pay more for the Loaf than the poor Man, on account of Money being of leſs Value to him than to the poor Man; for in a fair and juſt Bargain, the Value of the Price and Value of the Commodity, ought to be equal.

“ an Inquiry, whether, in fact, ſuch Proportion be obſerved? and of the manifold Evils which would attend a Permiſſion given to private Men, in their Sales and Contracts, of making themſelves Judges in this Particular; and of ſetting different Prices for the ſame Commodity, according to a Judgment, which might be grounded on Intereſt, Ignorance or Fraud. And therefore in a civil State, that, with reſpect to the Contracts of its Members with one another, the Value of Gold or Silver muſt be meaſured by its Weight and Fineneſs taken together; and conſequently, be the ſame to the Rich and to the Poor. However, that it is an Argument, and no weak one, drawn from the Nature of Things, of a general Obligation on Men, though Civil Laws cannot enforce it, to keep a due Proportion between their Expences and Fortunes, that, *without ſuch a Proportion*, MONEY, *which the common Conſent and Convenience of Mankind have made the Meaſure of the Value of Things, muſt fail, in fact, to be a juſt one.*

"equal; otherwiſe the Bargain will not "be juſt, the Buyer and Seller will cheat "one another."

That Gold and Silver are leſs valuable when they are more plentiful, appears from the Intereſt of Money, and from the Prices of Commodities in a rich Nation, and in a poor one. The Intereſt of Money which meaſures its Value for a certain Time, ſuppoſe a Year, is always higher when a Nation is poor, than when it is rich; which proves that the ſame Sum, for Inſtance 100*l*, leſſens in its Value, as the Plenty of Money increaſes. The Prices of Commodities are greater in a Nation, when it is rich than when it is poor, which farther proves that Gold and Silver leſſen in their Values as their Plenty encreaſes. For Commodities, eſpecially ſuch as are neceſſary for the Support of Life, though they may be dearer at one Time than at another from their being ſcarcer or more demanded, yet ſetting aſide theſe Conſiderations, are always of the ſame * Value. And therefore in a Nation if Commodities be always dearer, this can ariſe from nothing but Money's being more plentiful and conſequently leſs valuable, on which Account greater Prices are paid for Commodities than were or could be paid when Money was ſcarcer. Thus both from the Intereſt of Money, and the Prices of Commodities, it appears that the Value of Money leſſens as its Plenty increaſes.

But though the Rich, on Account of their having much more Money, than the Poor, † ought to pay greater Prices for the ſame Commodities than the Poor; yet as the ſelling of Commodities at different Prices, at high Prices to the Rich and low Prices to the Poor, would be attended with many obvious Inconveniencies and Evils; ſo it need not be practiſed, if all Men would live anſwerable to their Fortunes, by proportioning their Expences to their

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* *i. e.* Real intrinſic Value.

† See *Note*, p. 7.

their Riches. For a Man's Expences in Proportion to his Riches would then be a given Quantity; and the Value of Gold or Silver would then be meaſured by its Weight and Fineneſs taken together; and conſequently, would be the ſame to the Rich and to the Poor, as it ought to be to make Gold and Silver juſt Meaſures of the Values of Things.

SECTION II.

SECONDLY, I ſhall ſhew how to determine the Price of a Commodity in Gold or Silver.

PROPOSITION II.

The Price of a Commodity in Gold or Silver in a fair and juſt Bargain, is proportional to the Scarcity of the Commodity, and the Plenty of Money in the Nation in which the Commodity is purchaſed, taken together.

For in purchaſing a Commodity with Gold or Silver, the Value of the Price in a fair and juſt Bargain will be equal to the Value of the Commodity: For without ſuch an Equality the Bargain cannot be fair and juſt. But the Value of the Price, is as the Value of the Quantity of Gold or Silver that is paid; which Value, if Men live anſwerable to their Fortunes *, as I have ſhewn they ought to do, is proportional to the Weight and Fineneſs of that Quantity, taken together. And the Value of the Commodity, is as its Scarcity and Demand for it taken together; or as its Scarcity and Plenty of Money in the Nation taken together; becauſe all Commodities in a Nation are more or leſs demanded in Proportion to its Riches or Plenty of Money. And therefore the Price of a Commodity in Gold or Silver, if Men uſe Riches as they ought to do by proportioning their Expences to their Fortunes, will be meaſured by the Scarcity of

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* Vid. *ante*, Note on p. 7.

of the Commodity and Plenty of Money in the Nation, taken together.

COR. I. If the Gold or Silver Coins of a Nation be always of the ſame Fineneſs; the Weight of the Price of a Commodity in Gold or Silver Coin, will be as the Scarcity of the Commodity, and the Plenty of Money in the Nation, taken together.

If the ſame Commodity be twice as ſcarce, and the Plenty of Money in a Nation be twice as great at one Time as at another, the Weight of the Price in Gold or Silver of a given Fineneſs, will be four times as great; and but half as great, if the Commodity at the two different Times be equally ſcarce, but the Plenty of Money in the Nation be but one Half at one Time of what it is at the other.

The *Standard* Gold and *Standard* Silver of *England* out of which its Coins are formed, have each of them continued of the ſame Fineneſs for many Years[*]; the Fineneſs of Gold being $\frac{11}{12}$, and that of Silver $\frac{11.1}{12}$. Theſe Quantities being given, the Price of a given Commodity in Gold or Silver Coin, will be meaſured by the Weight of the Coin. The *Engliſh* Gold and Silver Coins are never weighed in Great Britain and Ireland, [†] even though they have loſt much of their original Weights and conſequently of their original Values, by wearing; becauſe when they are ſo much worn as to make a new Coinage neceſſary, the old worn Money is called in, and new Money of full Weight coined at the Expence of the Government, and returned to the Owners inſtead of the old worn Money that was called in and ſent to the Mint. So that the Loſs of Weight occaſioned by wearing, and the Expence of a new Coinage, all falls on the Government *.

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[*] The old *Standard* for Gold in *England* from the 18th Year of K. Edw. III. (when Gold was firſt coined) to the 18th Year of K. Hen. VIII, was twenty three Carats, three Carat Grains and an half of *fine* Gold to half a Carat Grain of *Allay*. From that Time the *Standard* varied until after the Coinage in the *firſt* Year of K. Cha. I. All Gold coined in *England* ſince that Coinage hath been of the new *Standard*, or twenty two Carats *fine*.

The old *Standard* of Silver was eleven Ounces two Penny Weight *fine* to eighteen Penny Weight of *Allay*, and ſo it continued until the 34th Year of K. Hen. VIII, when it varied until the 25th Year of Q. Elizabeth, at which Time it was reſtored; and hath been ſince conſtantly preſerved. See M. *Folkes*'s Tables of Coin.

[†] Since this Eſſay was wrote, the Practice of filing, and otherwiſe unlawfully diminiſhing, the Guineas, grew to ſuch an Height, that weighing ſeemed

COR. 2. If the Riches of a Nation, or its Plenty of Money, be given, or be the

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ſeemed to be the only effectual Means of putting a Stop to it: And in the Year 1750, the Bankers and Merchants of DUBLIN came to an Agreement, not to accept any Guineas, which did not weigh 5 Pwt. 3 Grains; 6 Grains being thought a reaſonable Allowance for Wear. The whole Nation followed the Example, and, as I hear, the Bank of *England* now obſerves the ſame Regulation.

* It may not be improper to obſerve, that however the Uſage hath been, as is here mentioned; yet it ſeems to be merely an Act of ROYAL Grace and Favour to accept, at the Mint, any Coin decried, otherwiſe than as *Bullion*.

the ſame at different Times, the Prices of the ſame Commodity will be as its Scarcity at thoſe Times. If the Commodity be ſcarce, it will be dear or ſold at an high Price; and if there be great Plenty of it, it will be cheap, or ſold at a low Price. We have daily Inſtances of the Truth of this *Corollary* in our Shops and Markets.

A Commodity may be ſcarce two Ways, either from the Smallneſs of the Quantity of the Commodity, or from a great Proportion of the Number of Buyers to the Number of Sellers. Many Buyers and few Sellers always make a Commodity dear; and few Buyers and many Sellers always make it cheap. So that the Proportion of the Number of Buyers to the Number of Sellers, will have the ſame Effect on the Price of a Commodity as a real Scarcity.

COR. 3. If a Commodity be equally ſcarce, and the Buyers to the Sellers be the ſame, at all Times; the Price of that

Commodity will be as the Plenty of Money in the Nation.

In K. Henry the 7th's Time, when Money in *England* was much ſcarcer than it is now, a Buſhel of Wheat was ſold for Sixpence, which then had as much fine Silver as Ninepence of our Money; and it is now five or ſix Times as dear.

COR. 4. If the Riches of a Nation, or its Plenty of Money, be proportional to its Trade with other Nations; the Price of a Commodity will be as its Scarcity and the Trade of the Nation with other Nations, taken together.

This is the Caſe of all Nations which have not Mines of their own, but have all their Money from their Trade with other Nations.

COR. 5. Since the natural Intereſt of Money leſſens as the Quantity of Money increaſes, and on the contrary; the Price of a Commodity will be as the Scarcity of the Commodity in Proportion to the Intereſt of Money in the Nation.

As the natural and true Intereſt of Money depends on the Riches or Quantity of Money in a Nation, and increaſes or leſſens as that Quantity leſſens or increaſes; ſo the legal Intereſt, or the Intereſt ſettled by Law, ought to be the ſame, neither greater nor leſs than the natural and true Intereſt, to prevent the following Evils. If the legal Intereſt be leſs than the natural Intereſt, Orphans and others who have their Fortunes in Money, will be deprived of ſo much which they have a natural Right to, as the legal Intereſt of their Money falls ſhort of its natural Intereſt: And they who pay Orphans their Fortunes or who borrow Money, will get what the Orphans or Lenders loſe, and have a natural Right to. And on the other Hand, if the legal Intereſt be greater than the natural Intereſt, Orphans and Perſons who lend Money, will get what they have no natural Right to, and what they get above their natural Right will be loſt to thoſe who pay the Orphans and who borrow Money. And therefore to prevent Injuſtice, the legal Intereſt of Money in a Nation, ought ever to be equal to its natural Intereſt.

The legal Intereſt in a Nation may be pretty rightly ſettled from obſerving its natural Intereſt, or that Intereſt at which People are willing to lend their Money independent of Law *.

That the Intereſt of Money in a Nation leſſens as its Plenty increaſes, appears from the legal Intereſt of Money in *England* for two hundred Years. In the Year

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* Laws cannot ſettle the Intereſt of Money with Accuracy: And although Regulations made for lowering it, in a Nation, below its natural Rate, may ſeem to promiſe fairer for having an Effect, than ſuch as are made for raiſing it above that Rate; yet in reality, Civil Laws cannot fix this Matter to any Degree of Exactneſs, in either Caſe: All therefore that can reaſonably be expected from them, is, to protect the Incautious and Diſtreſſed againſt Extortion and oppreſſive Uſury. Any farther Interpoſition, if not ineffectual, may be injurious.

1546, when *England* was much poorer than it is now, the Intereſt of Money in that Kingdom was ſettled at *ten per Cent.*: In the Year 1623, the Intereſt was lowered to *eight per Cent.*; in the Year 1660, it was lowered farther to *ſix per Cent.**; and in the Year 1713, it was lowered ſtill farther to *five per Cent.*; and though now the legal Intereſt of Money in *England* be *five per Cent.*, yet the Intereſt on good Security is rarely above *four per Cent.*; and often not ſo much †.

Since the Plenty of Money in a Nation which has not Mines of its own, is greater or leſs in Proportion to its Trade with other Nations; it may be aſked, whether to promote Trade, and conſequently to make a poor Nation grow rich, Money may not be ſettled at a low Intereſt by

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* Intereſt had been reduced to *ſix per Cent.*, in the Year 1651, by an Ordinance of the Powers then ſubſiſting.

† In *Ireland*, the Intereſt of Money was, in 1635, ſettled at *ten per Cent.*; it was reduced, in 1704, to *eight per Cent.*; in 1722, to *ſeven per Cent.*; and in 1732, to *ſix per Cent.*

Law, according to the Opinion of SIR JOSIAH CHILD and others? I anſwer, that this cannot be done without doing manifeſt Injuſtice to all thoſe who have their Fortunes in Money. Nor need it be done, if it be conſidered that when a Nation is poor, all Commodities particularly Proviſions and Land are cheap, and Labourers and Manufacturers work for low Wages; on which account, Perſons who borrow Money at high Intereſt to carry on Trade, will have that Intereſt repaid with ſufficient Profit, when the Commodities which they bought cheap at home, are ſold dear in the foreign Markets of rich Nations.

SECTION III.

THIRDLY, I ſhall ſhew how to determine the Proportion of the Value of any Weight of *fine* Gold to the Value of the ſame Weight of *fine* Silver.

PRO-

PROPOSITION III.

The Value of any Weight of fine Gold, is to the Value of the ſame Weight of fine Silver; as the Plenty of fine Silver, is to the Plenty of fine Gold.

For the Values of equal Weights of *fine* Gold and *fine* Silver are as the Scarcities of theſe Metals, and the Demands for them taken together. But we may ſuppoſe Gold and Silver to be equally demanded, becauſe Debts can be paid, and Commodities be purchaſed, with one as well as with the other. And therefore, the Value of any Weight of *fine* Gold, is to the Value of the ſame Weight of *fine* Silver; as the Scarcity of Gold is to the Scarcity of Silver; or as the Plenty of Silver is to the Plenty of Gold; for the Scarcities of Gold and Silver are reciprocally as their Plenties. Q. E. D.

Silver is much more plentiful than Gold, on which Account Gold is much more valuable than Silver. The Earth affords much more Silver than Gold; but the exact Quantities in which theſe two Metals are got out of the Earth perhaps cannot be exactly known, but may be determined with ſufficient Exactneſs for Uſe, by the Values put upon them by trading Nations. The Values of *fine* Gold and *fine* Silver put upon them by Trade and Commerce, may be look'd on as their true Values; and then the Quantities in which the Earth affords them will be known by being reciprocally as thoſe Values. If the Value of a Troy Pound of *fine* Gold be 15 Times the Value of a Pound Weight of *fine* Silver, then will the Quantities of Gold and Silver ariſing from the Earth, be as 1 and 15; and conſequently, one Pound of *fine* Gold will be worth fifteen Pounds of *fine* Silver.

The Market Values of *fine* Gold and *fine* Silver are their true Values, and ought to be the Values fixed upon them by Law in the Gold and Silver Coins of a Nation. For if Gold or Silver be more or leſs valuable in *Coin*, than it is in *Ingots* or *Bullion* at Market, the following Inconveniencies will ariſe.

If either Gold or Silver be more valuable at Market, than it is in Coin, this will occaſion a Scarcity of the Gold or Silver Coins of that Nation, provided the Difference between the Market and legal Values be any thing conſiderable. For the Difference will create a Temptation to melt down the Gold or Silver Coins, whilſt they are new, and have not loſt any Part of their Weight by wearing, that the melted Maſs may be ſold at Market at an higher Price than it paſſed for in the Form of Coin. This will put a Stop to the Mint, and hinder any new Coinage, leaſt the new Coins ſhould be melted down as faſt as they are coined; which will neceſſarily occaſion a Scarcity of the Gold or Silver Coins of the Nation.

On the contrary, if either Gold or Silver be leſs valuable at Market than it is in Coin; a Temptation will thence ariſe to turn uncoined Gold or Silver into Coin; whence the Nation will be overſtocked with counterfeit Gold or Silver Coins.

In *England* a Troy Pound of its *Standard* Silver is coined at the Mint into 62 Shillings; and the ſame Weight of its *Standard* Silver in *Bullion*, if I am rightly informed*, is worth at Market 63.5 Shillings.

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* The AUTHOR having afterwards received more authentic Information concerning the Price of *Bullion*; I find that, in the Copy which he begun in 1750, he intended an Alteration of what he here, and in ſome of the following Paragraphs, ſays in relation to the Value of the Guinea. The whole Paſſage is in theſe Words:

" The Proportion of *fine* Gold to *fine* Silver in " *England* may be thus found.

" A Pound Weight Troy of Gold, 11 Ounces " *fine* and 1 Ounce *Allay* is cut into 44.5 Guineas, " and a Pound Weight of Silver, 11 Ounces 2 " Penny Weight *fine*, and 18 Penny Weight *Allay* " is cut into 62 Shillings; and according to this Rate " a Pound Weight of *fine* Gold with a proportion-

Shillings. Hence 100 Pounds, or 2000 Shillings whilſt they are new, and before they have loſt any Part of their Weight by wearing, being melted down and

turned

“ able Quantity of *Allay* is worth 48.545454 Gui-
“ neas; for if 11 Ounces of *fine* Gold be worth 44.5
“ Guineas, 12 Ounces or a Pound of *fine* Gold will
“ be worth 48.545454 Guineas, or 1019.454534
“ Shillings, reckoning a Guinea at 21 Shillings,
“ which is its legal Value at preſent. A Pound
“ Weight of *fine* Silver with its *Allay* is worth
“ 67.027027 Shillings; for if 11.1 Ounces of *fine*
“ Silver, be worth 62 Shillings, 12 Ounces or a
“ Pound Troy of *fine* Silver will be worth 67.027027
“ Shillings. And comparing theſe Values of a Pound
“ Weight of *fine* Gold and *fine* Silver, or dividing
“ 1019.454534 by 67.027027, a Pound Weight of
“ *fine* Gold is worth 15.209604 Pounds of *fine* Sil-
“ ver; or 15 Pounds, 2 Ounces, 10 Penny Weight,
“ and 7 Grains of *fine* Silver. But Silver in *Bullion*
“ exportable is at preſent worth 3d. an Ounce more
“ than in Coin. The Market Price of Silver which
“ reſults from the Trade and Commerce between
“ Nation and Nation, is its true Price; and conſe-
“ quently to make Silver as valuable in *Coin* as it is
“ in *Bullion*, the Shilling muſt either be raiſed in the
“ Proportion of 65 to 62, or the Guinea lowered in
“ the Proportion of 62 to 65. But it is not ſo rea-
“ ſonable to raiſe the Silver as to lower the Gold,
“ becauſe Silver is a more univerſal Meaſure of the

“ Values

turned into *Bullion*, will ſell at Market for 2048 Shillings, which is 48 Shillings, that is near 2½ *per Cent*, more than the ſame Weight paſſed for in the Form of Coin.

“ Values of Commodities; and all Contracts run in
“ Pounds Shillings and Pence, which belong to Silver.
“ And therefore if the Guinea was lowered by Pro-
“ clamation in the Proportion of 62 to 65, its true
“ Value would be 20.03076 Shillings, which is lit-
“ tle more than 20*s.* and one Farthing. So that if
“ the Guinea was thus lowered it would pur-
“ chaſe ſo much Silver in *Bullion* of *Standard Allay*
“ as would make 20*s*; and a Pound Weight of *fine*
“ Gold would then be worth 14 Pounds, 5 Ounces,
“ 14 Penny Weight, and 11.5 Grains of *fine* Silver.

“ Since a Guinea in *England* is worth no more
“ than 20 Shillings, there will be an Advantage of
“ *five per Cent.*, in melting down new Silver before
“ it has loſt any Part of its Weight by wearing, and
“ turning it into *Bullion*. And this Advantage will
“ hinder us from having new Silver, ſo long as a
“ Guinea can purchaſe one Shilling more in *Bullion*
“ than in *Coin*; and it will likewiſe occaſion the Sil-
“ ver Coins, which are uſed in purchaſing Commo-
“ dities, to be old, and to have loſt much of their
“ Weights by long wearing.”

About the ſame Time, he compoſed TABLE IX, and framed the Second Claſs of THEOREMS in TABLE X.

Coin. This higher Price of *Engliſh* Silver at Market than in Coin, has created a Temptation in *England* to melt down the Silver Coins whilſt new and unworn, and of Conſequence has prevented any new Coinage of Silver for a conſiderable Time, which has made the Silver Coins of that Nation ſcarce, and to have loſt much of their Weight by wearing.

Now to remedy this Evil, a Guinea ought not to purchaſe more Silver in *Bullion* than it does in *Coin*; for if it can, it is an Argument that the legal Value of the Guinea in Silver is too great. And therefore to bring the Market Price of Silver to its Price in Coin, the Value of the Guinea muſt be lowered in the Proportion of the Value of a Pound of *Engliſh* Silver in *Coin* to the Value of the ſame Weight of it in *Bullion* at Market, that is, 21 Shillings which is the preſent *Engliſh* Value of a Guinea in Silver, muſt be leſſened in the Proportion of 62 to 63.5, or 21 muſt be multiplied into $\frac{62}{63.5}$; and the Product

20.5 Shillings is the true Value of a Guinea in Silver at preſent in *England*; for 21 : 63.5 :: 20.5 : 62; ſo that if the Guinea which now paſſes for 21 Shillings was lowered to 20 Shillings and 6 Pence it would then purchaſe no more Silver in *Bullion* than would make 62 Shillings in *Coin*.

Hence, by knowing the Market Price of Silver in *Bullion* of *Standard Allay*, and the Value of the ſame Quantity of Silver in *Coin*, we may know whether a juſt Value be placed upon the Guinea by Law. For if theſe two Values of *Standard* Silver in *Bullion* and in *Coin* be not equal, the legal Value of the Guinea is either too great or too little; it is too great when Silver is dearer in *Bullion* than in *Coin*, and it is too little when Silver is cheaper in *Bullion* than in *Coin*.

The Proportion of the Value of a Pound Weight of *fine* Gold to the Value of a Pound Weight of *fine* Silver, both according to the legal and Market Values of theſe Metals, may be eaſily found. The *Allay* in Gold and Silver being conſidered as of no Value; the Legal or Mint Value of a Pound Weight of *fine* Silver, in *Engliſh* Shillings will be 67.027. For as 11.1 Ounces, the Quantity of *fine* Silver contained in a Pound Weight of the *Standard* Silver of *England*; is to 62, the Number of Shillings into which a Pound of that Silver is cut at the Mint*: So is 12 Ounces or a Pound Weight of *fine* Silver, to 67.027 Shillings the Value of a Pound Weight of *fine* Silver; for this Quantity of *fine* Silver with a proportionable Quantity of *Allay* would at the Mint be cut into this Number of Shillings. And the Legal or Mint Value of a Pound Weight of *fine* Gold is 48.543 Guineas, or 934.5 Shillings, the legal Value of a Guinea in Silver being 21 Shillings in *England*. For as 11 Ounces, the Quantity of *fine* Gold contained in a Pound Weight of the *Standard* Gold of *England*; is to 44.5, the Number of Guineas into which a Pound Weight of that Gold is cut at the Mint: So is 12 Ounces or a Pound Weight of *fine* Gold, to 48.545, the Number of Guineas into which a Pound of *fine* Gold with a proportionable Quantity of *Allay* would be cut at the Mint. This Number of Guineas being multiplied by 21, the Number of Shillings for which a Guinea now paſſes in *England*, will give 1019.454 Shillings for the preſent legal Value in *England* of a Pound Weight of *fine* Gold. From theſe legal Values of a Pound Weight of *fine* Silver and *fine* Gold, the Value of a Pound Weight of *fine* Gold is to the Value of a Pound Weight of *fine* Silver, as 1019.454 is to 67.027; or as 15.2094 is to 1: At which Rate a Pound Weight of *fine* Gold is worth 15 Pounds, 2 Ounces, 10 Penny Weight, and 6 Grains of *fine* Silver in *England*, according to the preſent legal Values of Gold and Silver in that Kingdom.

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* Ever ſince the 43d Year of Q. Elizabeth, the Pound of *Standard* Silver hath been cut into 62 Shillings. And the Pound of *Standard* Gold hath been cut into 44.5 Guineas, ever ſince the firſt Coinage of thoſe Pieces, in the 15th Year of K. Charles II.

An Ounce of Gold in *London* of *Standard Allay* is worth 78 Shillings; at which Rate a Pound Weight of *fine* Gold, is worth 15 Pounds, 2 Ounces, 15 Penny Weight, and 19 Grains of *fine* Silver.

If the Value of a Guinea was reduced to 20 Shillings and 6 Pence, a Pound Weight of *fine* Gold would then be worth 14.857 Pounds of *fine* Silver; or a Pound Weight of *fine* Gold would be more valuable than a Pound Weight of *fine* Silver, in the Proportion of 14.857 to 1. This is nearly the ſame with the Proportion of the Value of *fine* Gold to *fine* Silver, which Sir Isaac Newton has given, in his Repreſentation hereunto annexed, which he collected from the Courſe of Trade and Exchange between Nation and Nation in all *Europe*.

SECTION IV.

FOURTHLY, I ſhall ſhew how to determine the Fineneſs of *Allayed* Gold and *Allayed* Silver, both from their *Specific Gravities* and their *Aſſays*.

PROBLEM.

If two Things be mixed together, and the Specifick Gravities of the Mixture, and of the Things mixed be all given; to find the Proportion of the Quantities of the Things mixed to each other.

If the Magnitudes of the two Things be denoted by A and B, their Specifick Gravities by a and b, and the Specifick Gravity of the Mixture by e; then, ſince the Weight of a Body is as its Magnitude and Specifick Gravity, taken together; the Weights of the two Things in the Mixture

ture will be Aa and Bb, and their Sum $Aa + Bb$ will be the Weight of the Mixture, which Weight is as the Sum of the Magnitudes of the two Things into the Specifick Gravity of the Mixture, that is, as $Ae + Be$. Theſe two Weights are equal, that is $Aa + Bb = Ae + Be$. Hence, $Aa - Ae = Be - Bb$; and $e - b : a - e :: A : B$. And, by multiplying the Antecedents by a, and the Conſequents by b, we ſhall have $\overline{e-b} \times a : \overline{a-e} \times b :: Aa : Bb$. Q. E. I.

EXAMP. I. If the Mixture be compoſed of fine Gold and fine Copper, whoſe Specifick Gravities are 19.6246, and 8.8000; and if the Specifick Gravity of the Mixture be 17.8000, the Specifick Gravity of Water being 1; then will $\overline{e-b} \times a$ be to $\overline{a-e} \times b$; as 176.62140 is to 16.05648; that is as 11 to 1. In this Mixture the Weight of fine Gold is to the Weight of fine Copper, as 11 is to 1; which is the Proportion of fine Gold to fine Copper in the *Standard*

Gold of *England*, out of which its Coins are made.

Examp. 2. If the Mixture be fine Silver and fine Copper, whoſe Specifick Gravities are 10.5222 and 8.8000, and the Specifick Gravity of the Mixture is 10.3700, the Specifick Gravity of Water being 1; then will $\overline{e-b}\times a$, be to $\overline{a-e}\times b$; as 16.51985400 is to 1.33936; or as 11.1 is to 0.9. This is the Proportion of fine Silver to fine Copper in the *Standard* Silver of *England* out of which its Coins are formed.

Cor. 1. If W denote the Weight of the whole Mixture; that is, if W be equal to $A a + B b$; then by Compoſition, $\overline{a-b}\times e : \overline{e-b}\times a :: W : A a$.

If the mixture be fine Gold and fine Copper; and it's Weight be a Troy Pound or 12 Ounces; and if the Specifick Gravity of the Mixture, fine Gold and fine Copper, denoted by e, a and b, be

17.8000, 19.6246 and 8.8000, then will, $\overline{a-b}\times e : \overline{e-b}\times a :: 192.67784 : 176.6214 :: W : Aa :: 12 : 11$. So that a Troy Pound of that Mixture will contain 11 Ounces fine and 1 Ounce *Allay*.

COR. 2. If W denote the Weight of the Mixture; that is, if W be equal to $Aa + Bb$, then by Compoſition $\overline{a-b}\times e : \overline{a-e}\times b :: W : Bb$.

If the Mixture be compoſed of fine Gold and fine Copper, and its Weight be a Troy Pound; and if the Specifick Gravities of the Mixture, fine Gold and fine Copper, be 17.8000, 19.6246, and 8.8000; then will, $\overline{a-b}\times e : \overline{e-b}\times a :: 192.67784 : 16.05648$, that is as 12 to 1. So that a Troy Pound, or 12 Ounces, of the Mixture contains 1 Ounce *Allay*, and of Conſequence 11 Ounces fine.

COR. 3. If W and w denote the Weights of the two Parts of the Mixture,

ture, A a and B b; and if theſe Weights, and the Specifick Gravities of the two Ingredients be given, that is, if W, w, a, b be given; e, the Specifick Gravity of the Mixture, will be equal to $\frac{\overline{W+w}\times ab.}{Wb+wa}$. For by this Propoſition $e\times\overline{A+B}=Aa+Bb$, equal to $W+w$ by Suppoſition. And therefore $e=\frac{W+w}{A+B}$. But $A=\frac{W}{a}$, and $B=\frac{w}{b}$, which being ſubſtituted inſtead of A and B, we ſhall have e equal to $\frac{\overline{W+w}\times ab}{Wb+wa}$.

If the two Ingredients of the Mixture be fine Gold and fine Copper, whoſe Weights are as 11 and 1, and whoſe Specifick Gravities are 19.6246 and 8.8000; Then e will be equal to $\frac{2072.35776}{116.4246}=$ 17.8000 very nearly.

By this *Corollary* we find the Specifick Gravity of a Mixture compoſed of fine Gold and fine Copper, or of fine Silver and fine Copper, by knowing the

Weights, and Specifick Gravities of the two Ingredients.

The Weight of fine Gold contained in a Troy Pound, is expreſſed, either in Carats, Carat Grains or Parts of a Carat Grain; or in Penny Weights and common Grains; or in Ounces and Parts of an Ounce. And the Weights of Gold and Silver Coins are expreſſed in Penny Weights and common Grains; or in common Grains alone. Now a Carat is half an Ounce Troy, or 10 Penny Weight, or 240 common Grains; and a Carat Grain is a Troy Drachm, or 60 common Grains. An Ounce Troy contains 20 Penny Weights, and a Penny Weight 24 common Grains. Hence a Pound Troy of Gold of the *Engliſh Standard* contains 22 Carats of fine Gold, and 2 Carats of *Allay*, or 11 Ounces of fine Gold, and 1 Ounce of *Allay*. For the more ready Computation of the Specifick Gravities of *Allayed* Gold and *Allayed* Silver in the ſecond and third TABLES, I have in the firſt Part of the firſt TABLE, expreſſed Carat Grains and Parts of a Carat Grain in Decimal Parts of a Carat; and in the ſecond Part of it, I have expreſſed common Grains in Decimal Parts of a Penny Weight.

If the two Ingredients of the Mixture be fine Gold and fine Copper, whoſe Specifick Gravities, by Experiment, are 19.6246 and 8.8000; and if the Sum of the Weights in the Mixture be given, ſuppoſe it be a Troy Pound or 24 Carats; then, as the Weight of Gold in the Mixture increaſes or leſſens, the Weight of the Copper will leſſen or increaſe, and that equally, otherwiſe the Sum of their Weights could not be given. If the Quantity of fine Gold be leſſened and the Quantity of fine Copper increaſed continually by a Quarter of a Carat Grain, W and w will be known, and e the Specifick Gravity of the Mixture will be equal to $\frac{4144.71552}{8.8W+19.6246w}$.

If the two Ingredients of the Mixture be fine Silver and fine Copper, whoſe Specifick Gravities are 10.5222 and 8.8000; and if the Sum of the Weights of fine Silver and fine Copper in the Mixture be always the ſame, ſuppoſe 240 Penny Weights; then as the Weight of fine Silver in the Mixture leſſens or increaſes, the Quantity of fine Copper will increaſe or leſſen, and that equally, otherwiſe the Sum of their Weights could not always continue the ſame. If the Quantity of fine Silver be leſſened continually, and the Quantity of fine Copper continually increaſed, by one Penny Weight, W and w will be given; and e the Specifick Gravity of the Mixture will be equal to $\frac{22222.88640}{8.8\,W + 10.5222\,w}$.

By theſe THEOREMS I computed TABLE II; and TABLE III. The reſt of the TABLES of Coins were formed from Experiments.

LEMMA.

LEMMA.

The Specifick Gravity of a Body is meaſured by the Proportion of its Quantity of Matter to its Magnitude; that is, putting D *for the Specifick Gravity,* Q *for the Quantity of Matter and* M *for the Magnitude of the Body;* D *is meaſured by* $\frac{Q}{M}$.

For the Quantity of Matter in a Body is as its Magnitude and Denſity, or as its Magnitude and Specifick Gravity, taken together; that is, Q is as D M. And therefore the Specifick Gravity of a Body, will be meaſured by its Quantity of Matter in Proportion to its Magnitude; that is, D will be meaſured by $\frac{Q}{M}$.

COR. 1. If the Quantity of Matter in a Body be given; its Specifick Gravity, will be meaſured by the inverſe Ratio of its Magnitude; that is, if Q be given, D will be meaſured by $\frac{1}{M}$.

The

The Denſities or Specifick Gravities of Bodies are altered by all Things which can change their Magnitudes without making any Alteration in their Quantities of Matter. HEAT and COLD change the Magnitudes of Bodies, and, in hard, denſe and dry Bodies, they do this without making any Change in their Quantities of Matter. It has been found by Experiment, that the Magnitudes of Metals are ſomething greater in *Summer* than in *Winter* without any Change made in their abſolute Weights, or in their Quantities of Matter. Heat ſwells Bodies and increaſes their Magnitudes, and Cold contracts Bodies and leſſens their Magnitudes; and when this is done without any Loſs or Gain of Parts, as it commonly is in hard denſe and dry Bodies, Heat leſſens, and Cold increaſes their Denſities or Specifick Gravities.

A Force acting on the Surfaces and compreſſing their Parts together, changes their Specifick Gravities. Hammering Metals, is a Force acting on their Surfaces, which Force ſometimes increaſes, and ſometimes leſſens their Specifick Gravities, as appears by the following Experiments. The Specifick Gravity of a Bit of Silver unhammered was 10.070, and 10.352 when hammered. The Specifick Gravity of another Bit of fine Silver unhammered was 10.666, hammered was 10.577, and hammered more was 9.963. The Specifick Gravity of a Third Bit of fine Silver unhammered was 9.316, hammered was 10.516, and hammered more was 10.320. And the Specifick Gravity of a Fourth Bit of Silver unhammered was 9.772, hammered moderately was 10.177, and hammered ſtrongly was 10.221. In ſome other Inſtances I have found hammering to make but little Alteration in the Specifick Gravity of Silver, though the Specifick Gravity is commonly altered by it. Moderate hammering increaſes the Specifick Gravity, but much hammering ſo as to heat the Metal by the repeated Force of the Percuſſion, generally leſſens it: For Bodies are rarefied by Heat and condenſed by Cold, and their Specifick Gravity leſſens or increaſes in Proportion to the Degree of Rarefaction or Condenſation, if no Change be made by theſe Qualities of Heat and Cold in the Quantities of Matter of the Bodies.

If a Body be compreſſed by a Force acting on its Surface with a Degree of Strength proportional to the Surface, the Degree of Condenſation cauſed by that Force, will be greater in a ſmaller Body than in a larger, ſuppoſing the two Bodies to be Homogeneal, or to be made of the ſame Kind of Matter. The Truth of this appears from the following Experiment. I took the Specifick Gravity of Shot of different Sizes, and always found ſmall Shot a little Specifically heavier than large Shot, as it ought to be: For the Grains of ſmall Shot have larger Surfaces in Proportion to their Quantities of Matter, than the Grains of large Shot have in Proportion to their Quantities of Matter. And conſequently, the Cold of the Water, into which the melted Lead is dropped in making Shot, by acting on the Grains in Proportion to their Surfaces, will act more powerfully on the Grains of ſmall Shot in Proportion to their Quantities of Matter, than on the Grains of large Shot in Proportion to their Quantities of Matter, becauſe the Surface in Proportion to the Magnitude is greater in the Grains of ſmall Shot than in the Grains of large Shot. The Conſequence of which will be, that the Grains of ſmall Shot will be more condenſed by the Cold of the Water than the Grains of large Shot, and the Specifick Gravity of the former greater than the Specifick Gravity of the latter.

COR. 2. The Specifick Gravity of a Body will be changed by a Change made either in its Quantity of Matter or in its Magnitude. D will be changed by a Change made either in Q or M.

The Specifick Gravity of a Body will be increaſed either by an Increaſe of its

Quantity of Matter, or a Diminution of its Magnitude; and the Specifick Gravity of a Body will be leſſened either by a Diminution of its Quantity of Matter or an Increaſe of its Magnitude; D will be increaſed by increaſing Q, or leſſening M; and D will be leſſened either by leſſening Q or increaſing M.

The Specifick Gravity of a Body, will likewiſe be increaſed when both its Quantity of Matter and its Magnitude are increaſed, but its Quantity of Matter in a greater Proportion than its Magnitude; and on the contrary, its Specifick Gravity will be leſſened when both its Quantity of Matter, and its Magnitude are leſſened, but its Quantity of Matter leſſened in a greater Proportion than its Magnitude. D will be increaſed when both Q and M are increaſed, but Q in a greater Proportion than M; and D will be leſſened, when both Q and M are leſſened, but Q leſſened in a greater Proportion than M.

The Quantity of Matter in a Body may be increaſed by Moiſture inſinuating itſelf into the Pores of the Body; and if the Moiſture be drawn into the Body with Force, it may by Virtue of that Force preſs the Parts of the Body outwards, and thereby inlarge its Magnitude. This is the Caſe of dry Woods, and all dry Vegetables, when they are wet with Water or expoſed to a moiſt Atmoſphere; for they increaſe both in Weight and Magnitude. Their Weights or Quantities of Matter increaſe by the Moiſture imbibed, and their Magnitudes increaſe by the Force with which that Moiſture is drawn into their Pores and preſſes their Parts outwards. But their Quantities of Matter are increaſed in a greater Proportion than their Magnitudes. For Woods and all Vegetable and Animal Fibres are ſpecifically heavier when wet than when dry. The contrary happens when moiſt Bodies are dried; their Quantities of Matter, Magnitudes and Specifick Gravities all leſſen, but their

Quantities of Matter leſſen in a greater Proportion than their Magnitudes.

The Specifick Gravity of a mixed Body compoſed of two Ingredients, of different Sorts of Matter, in which Mixture the Parts of the laſt Compoſition of one Ingredient are inſinuated into the Pores of the Parts of the laſt Compoſition of the other Ingredient, without any Enlargement of the Magnitudes of thoſe Parts, I ſay, the Specifick Gravity of ſuch a Body will be greater, than it would be from a bare *Juxta-Poſition* of Parts without any Inſinuation. For the Magnitude of the Mixture will be leſs than the Sum of the Magnitudes of the two Ingredients before mixing. But a Diminution of the Magnitude of the ſame Quantity of Matter, always occaſions an increaſe of its Specifick Gravity. In taking the Specifick Gravities of Mixtures of ſeveral Kinds of Salt and Water, I found the Specifick Gravity of each Mixture to be greater than it would have been from a bare Contiguity of the Particles of the laſt Compoſition of the two Ingredients. Whence, I infer that in all Mixtures of Salt and Water, there is an Inſinuation of the Particles of the Water into the Pores of the Particles of the Salt of the laſt Compoſition.

The Specifick Gravity of Coins is made leſs by wearing. For 9 of Q. ANN's Guineas, whoſe mean Weight in Air was 128.36 Grains, had a mean Specifick Gravity of 17.892; and 7 of her Guineas, whoſe mean Weight in Air was 127.56, had a mean Specifick Gravity of 17.709. And 4 Guineas of K. GEORGE THE Iſt, whoſe mean Weight in Air was 129.302, had a mean Specifick Gravity of 17.883; and 6 of his Guineas, whoſe mean Weight in Air was 127.52, had a mean Specifick Gravity of 17.781. From theſe Inſtances it appears, that Coins which are leſs worn, are ſomething ſpecifically heavier, than Coins which are more worn; which may be owing, partly, to their not being ſo long expoſed to the Warmth of the Pocket; for a ſmall Degree of Heat, no greater than that of the Surface of a Human Body, may in length of Time relax Coins and leſſen their Specifick Gravities; and partly, to the Coins being ſomething Denſer at their Surfaces than in their inward Parts from the Force which acts on their Surfaces to give the Impreſſion in Coining. For this being the Caſe, Coins muſt grow Specifically lighter by wearing. That Metals, condenſed by the Force of Coining, may relax by a gentle Heat and wearing in a long Courſe of Time, is agreeable to one of the Reaſons of the Increaſe of Meaſures given by Sir Isaac Newton, in his *Diſſertation upon Cubits*. For he ſays, "that Iron beaten with a Hammer "may in a long Courſe of Time relax.

By Tables II and III, we may know the Fineneſs of Gold and Silver Coins from their Specifick Gravities, provided thoſe Specifick Gravities be Means taken from a large Number of Experiments.

From TABLES IV, V, VI, and VII, it appears that we cannot with Exactneſs judge of the Fineneſs of Gold and Silver Coins from the Specifick Gravities of ſingle Pieces; but we may do ſo, with ſufficient Exactneſs for Uſe, by Means taken from the Specifick Gravities of a conſiderable Number, ſuppoſe 20.

Having ſhewn how to determine the Fineneſs of Gold and Silver from their SPECIFICK GRAVITIES, I now come to determine their Fineneſs from their ASSAYS.

PROPOSITION IV.

If a ſmall Weight in common Grains of Allayed *Gold or* Allayed *Silver be* ASSAYED, *in Order to obtain the Grains of fine Gold or fine Silver contained in that Weight; the Weight of the* ASSAY, *will be equal to the Weight and Fineneſs of the Quantity that is* ASSAYED, *taken together. If* w *and* A *denote the Weight of*

Gold or Silver that is ASSAYED, *and the Weight of the* ASSAY, *in common Grains*; *and* W *the Weight of fine Gold or fine Silver contained in a Troy Pound of that Gold or Silver, then will* A *be equal to* $w \times \frac{W}{12}$ *when both the Troy Pound and* W *are expreſſed in Ounces*; *and* A *equal to* $w \times \frac{W}{24}$ *when both the Troy Pound and* W *are expreſſed in Carats*; *and* A *equal to* $w \times \frac{W}{240}$ *when a Troy Pound and* W *are both expreſſed in Penny Weights.*

For the ASSAY being the Weight of fine Gold or fine Silver contained in the Weight of the *Allayed* Gold or *Allayed* Silver that is ASSAYED; that is, A being the Weight of fine Gold or fine Silver contained in the Weight w, and W being the Weight of fine Gold or fine Silver contained in a Troy Pound expreſſed in Ounces, Carats or Penny Weights; We ſhall have theſe Proportions A : w :: W : 12, and A : w :: W : 24 and A : w :: W : 240; whence $A = \frac{w\,W}{12}$, $A = \frac{w\,W}{24}$, and $A = \frac{w\,W}{240}$, as W is expreſſed in Ounces, Carats, or Penny Weights.

The ASSAYS of Gold and Silver are made from ſmall Weights of *Allayed* Gold and *Allayed* Silver. In *Dublin* *, the ASSAYS at preſent are made from 9 Grains of Gold, and 18 Grains of Silver. If the Gold and Silver be of the *Engliſh Standard*, that is, if Gold be 11 Ounces fine, and 1 Ounce *Allay*, and if Silver be 11.1 Ounces fine, and 0.9 Part of an Ounce *Allay*; the Weights of the ASSAYS made from 9 Grains of that Gold, and 18 Grains of that Silver, will be 8.25, and 16.65 Grains. The Weights of theſe ASSAYS of *Engliſh* Gold and *Engliſh* Silver, are the *Standard* Weight in TABLE VIII.

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* In *March* 1747, the AUTHOR had an Account, that, in *London*, the ASSAYS were made from 7.25 Grains nearly of Gold, and 19.25 Grains nearly of Silver.

I got two Sets of Weights made, one for Gold and the other for Silver, expreſſing the Troy Grains placed under the two Columns, ASSAY &c., of this TABLE. By theſe Weights, and a good Pair of Scales which will turn with the 100th Part of a Grain, when a Weight of not above 18 or 20 Grains is placed in each Scale, we may compare the ASSAYS of Gold and Silver of any *Allay*, with the *Standard* ASSAYS, and thence know how much the Gold or Silver from which thoſe ASSAYS were made, is better or worſe than Gold or Silver of the *Engliſh Standard*; as will be ſhewn in the following Examples.

EXAM. 1. If an ASSAY in Gold be heavier than the *Standard* ASSAY by the Sum of the Weights 0.094 and 0.047; that Gold is better than *Standard* by a

Carat Grain and an half, or by $\frac{3}{16}$th Parts of an Ounce in a Troy Pound.

EXAM. 2. If an ASSAY in Gold be lighter than the *Standard* ASSAY by the Sum of the Weights 0.188, 0.094 and 0.047; that Gold is worſe than *Standard* by 3 Carat Grains and an half in a Troy Pound.

EXAM. 3. If an ASSAY in Silver be heavier than the *Standard* ASSAY by the Sum of the Weights 0.750, and 0.375; that Silver is better than *Standard* by 15 Penny Weight, or three Quarters of an Ounce in a Pound Troy.

EXAM. 4. If an ASSAY in Silver be lighter than the *Standard* ASSAY by the Weights 3.000 and 1.500; that Silver will be worſe than *Standard* by 60 Penny Weight, or 3 Ounces in a Troy Pound.

SECTION

SECTION V.

FIFTHLY, I ſhall ſhew how to determine the Values of *Foreign* Gold and Silver Coins in *England*, according to the *legal* Values of the Gold and Silver Coins of that Nation.

PROPOSITION V.

Having given the Weight and Fineneſs of a Foreign *Gold or Silver Coin, and putting* w *for the Weight of the Coin in Grains,* d *for the Difference of its Fineneſs from the Fineneſs of the* Guinea *or* Shilling *expreſſed in Carats and Carat Grains if the Coin be Gold, and in Penny Weights if the Coin be Silver, and* v *for the Value of the* Foreign *Coin in* England; *I ſay that* v *is equal to* $\frac{w \times \overline{22 \pm d}}{135.60192615}$

Shillings if the Coin be Gold; and v *is equal to* $\frac{w \times \overline{222 \pm d}}{1718.70967730}$ *Pence if the Coin be Silver.*

For the Value of any Gold or Silver Coin is as its Weight and Fineneſs taken together. The Weights of the Guinea and Shilling, as they come out of the Mint, and before they have loſt any Part of their Weights by wearing; are 129.43820224, and 92.90322580 Grains, and their Degrees of Fineneſs are as 22 and 222, the Carats of fine Gold and Penny Weights of fine Silver contained in a Troy Pound of the *Allayed* Gold and Silver out of which they are coined; and the legal Value of the Guinea in *England* is at preſent 21 Shillings, and the Value of the Shilling 12 Pence. How much the Gold and Silver of the *Foreign* Coins are better or worſe than *Standard* may be known from their Specifick Gravities by TABLES II and III, or from their Aſſays by TABLE VIII; that is, 22 ± d and 222 ± d, which expreſs the Fineneſs of the *Foreign* Gold and Silver Coin, may be known by thoſe Tables. And the Fineneſs being known, the *Engliſh* Value of the *Foreign* Gold and Silver Coin in Shillings and Pence, *i. e.* the Value of the Gold Coin in Shillings, and the Value of the Silver Coin in Pence, will be had from theſe two Proportions $21 : 129.43820224 \times 22 :: v : w \times \overline{22 \pm d}$. whence $v = \frac{w \times \overline{22 \pm d}}{135.60192615}$ Shillings, the Value of the Gold Coin. And $12 : 92.90322580 \times 222 :: v : w \times \overline{222 \pm d}$. whence $v = \frac{w \times \overline{222 \pm d}}{1718.70967730}$ Pence, the Value of the Silver Coin.

[When a *Guinea* in *England* paſſed for 21 Shillings and 6 Pence, then the Value of a *Foreign* Gold Coin is had by this Analogy, $21.5 : 129.43820224 \times 22 :: v : w \times \overline{22 \pm d}$. whence $v = \frac{w \times \overline{22 \pm d}}{132.4530441}$ Shillings.]

EXAM. 1. The Weight of the half Moydore before it has loſt any of its Weight by wearing, is 83 Grains, and its Specifick Gravity is 17.7226 * by TABLE V, which ſhews this Coin at a Medium to be $\frac{3}{4}$ths of a Carat Grain worſe than *Standard* by TABLE II. The Fineneſs of this Gold is 21.8125 Carats in a Troy Pound. The Value therefore of this Coin in *England* is $\frac{83 \times 21.8125}{135.6019}$ = 13*s.* 4*d.* nearly.

EXAM. 2. The Weight of the Double Ducat of the Elector of *Hanover*, is 106.5 Grains, and the Fineneſs of its Gold is 23.5 Carats, according to SIR ISAAC NEWTON. And therefore v its Value in *England* is $\frac{106.5 \times 23.5}{135.6019}$ = 18*s.* 5*d.* 1 Farthing nearly.

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* There ſeems to be a Miſtake here. For the mean Specifick Gravity in the TABLE referred to,

Sir Isaac Newton in his Table of the Assays and Weights of *Foreign* Gold and Silver Coins drawn up in the latter End of K. William's Reign, when *England* abounded with thoſe Coins, ſets down both the true Weights and *Standard* Weights, and from the *Standard* Weights computes the Values of the ſeveral Coins. Now the *Standard* Weight of a *Foreign* Gold or Silver Coin, which differs in Fineneſs from the *Engliſh Standard*, is the Weight the Coin ought to have if its Fineneſs was that of the *Engliſh Standard*. For that *Standard* Weight multiplied into 22 for Gold and into 222 for Silver, will expreſs the true Value of the Gold or Silver Coin, according to the Values of Gold and Silver in *England*. If W denote the

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to, is 17.7184, which ſhews this Coin to be but about ¼th of a Carat Grain worſe than *Standard*, by Table II. The Fineneſs then, is 21.9375, and the Value comes out a little above 13*s.* 5*d.* The Author hath, in the Copy, made a Mark on this Example; which, I preſume, was a *Memorandum* for altering it.

the *Standard* Weight of the Gold or Silver Coin, then $W \times 22$, will expreſs the Value of the Gold Coin, and will be equal to $w \times \overline{22 \pm d}$, whence $W = \frac{w \times \overline{22 \pm d}}{22}$. And if W be the *Standard* Weight of a *Foreign* Silver Coin, $W \times 222$ will expreſs the Value of the Silver Coin, and will be equal to $w \times \overline{222 \pm d}$, whence $W = \frac{w \times \overline{222 \pm d}}{222}$. Having got the *Standard* Weights of the Gold and Silver Coin; the Values of thoſe Coins in *England* will be found from the Values of the Guinea and Shilling by theſe Proportions. As the Weight of the Guinea, is to its Value; ſo is the *Standard* Weight of the Gold Coin, to its Value in *England*, that is $129.43820224 : 21 :: \frac{w \times \overline{22 \pm d}}{22} : v$, whence $v = \frac{w \times \overline{22 \pm d}}{135.60192615}$ Shillings, as above. And as the Weight of the Shilling, is to its Value; ſo is the *Standard* Weight of the *Foreign* Silver Coin, to its Value in *England*, that is 92.90322580 : 12 :: $\frac{w \times \overline{222 \pm d}}{222}$: v, whence $v = \frac{w \times \overline{222 \pm d}}{1718.70967730,}$ Pence, as above.

SECTION VI.

SIXTHLY, and *laſtly*, I ſhall conclude with the following Repreſentation of Sir Isaac Newton's.

To the Right Honourable the Lords Commissioners *of His* Majesty's ~~Revenue~~ Treasury:

May it pleaſe your Lordſhips,

IN Obedience to your Lordſhips Order of Reference of *Auguſt* 12th, that I ſhould lay before your Lordſhips a State of the Gold and Silver Coins of this Kingdom in Weight and Fineneſs, and the Value of Gold in Proportion to Silver, with my Obſervations and Opinion, and what Method may be beſt for preventing the melting down of the Silver Coin; I humbly Repreſent, That a Pound Weight Troy of Gold, 11 Ounces fine, and 1 Ounce Allay, is cut into 44 Guineas and an Half; and a Pound Weight of Silver, 11 Ounces, 2 Penny Weight fine, and 18 Penny Weight Allay, is cut into 62 Shillings: and according to this Rate, a Pound Weight of fine Gold is worth 15 Pounds Weight 6 Ounces 17 Penny Weight and 5 Grains of fine Silver, reckoning a Guinea at 1 *l.* 1 *s.* 6 *d.* in Silver Money. But Silver in Bullion exportable is uſually worth 2 *d.* or 3 *d. per* Ounce more than in Coin. And if at a Medium, ſuch Bullion of Standard Allay be valued at 5 *s.* 4½ *d. per* Ounce, a Pound Weight of fine Gold will be worth but 14 Pound Weight 11 Ounces, 12 Penny Weight 9 Grains of fine Silver in Bullion. And at this Rate, a *Guinea* is worth but ſo much Silver as would make 20*s.* 8*d.* When Ships are lading for the *Eaſt-Indies*, the Demand of Silver for Exportation raiſes the Price to 5*s.* 6*d.* or 5*s.* 8*d.* *per* Ounce, or above; but I conſider not thoſe extraordinary Caſes.

A *Spaniſh* Piſtole was coined for 32 Reas, or 4 Pieces of Eight Reas, uſually called Pieces of Eight, and is of equal Allay, and the 16th Part of the Weight thereof. And a *Doppio Moeda* of *Portugal* was coined for 10 *Cruſadoes* of Silver, and is of equal Allay, and the 16th Part of the Weight thereof; Gold is therefore in *Spain* and *Portugal* of 16 Times more Value than Silver of equal Weight and Allay, according to the Standard of thoſe Kingdoms; at which Rate, a Guinea is worth 22*s.* 1*d.* But this high Price keeps their Gold at Home in good Plenty, and carries away the *Spaniſh* Silver into all *Europe*; ſo that at Home they make their Payments in Gold, and will not pay in Silver without a Premium.

mium. Upon the coming in of a Plate-Fleet, the Premium ceaſes, or is but ſmall; but as their Silver goes away and becomes ſcarce, the Premium encreaſes, and is moſt commonly about 6 *per Cent.* which being abated, a Guinea becomes worth about 20*s.* 9*d.* in *Spain* and *Portugal.*

In *France* a Pound Weight of fine Gold is reckoned worth 15 Pound Weight of fine Silver; in raiſing or falling their Money, their King's Edicts have ſometimes varied a little from this Proportion, in Exceſs or Defect; but the Variations have been ſo little that I do not here conſider them. By the Edict of *May* 1709, a new Piſtole was coined for 4 new *Lewiſes*, and is of equal Allay, and the 15th Part of the Weight thereof, except the Errors of their Mints. And by the ſame Edict, fine Gold is valued at 15 Times its Weight of fine Silver, and at this Rate a Guinea is worth 20*s.* 8½*d.* I conſider not here the Confuſion made in the Monies in

France, by frequent Edicts to ſend them to the Mint, and give the King a Tax out of them; I conſider the Value only of Gold and Silver in Proportion to one another.

The Ducats of *Holland* and *Hungary*, and the Empire, were lately current in *Holland* among the common People in their Markets and ordinary Affairs, at 5 Guilders in Specie and 5 Stivers, and commonly changed for ſo much Silver Monies in three Guilder-Pieces, and Guilder Pieces as Guineas are with us for 21*s*. 6*d*. *Sterling*; at which Rate a Guinea is worth 20*s*. 7½*d*.

According to the Rates of Gold to Silver in *Italy*, *Germany*, *Poland*, *Denmark* and *Sweden*, a Guinea is worth about 20*s*. and 7*d*. 6*d*. 5*d*. or 4*d*. for the Proportion varies a little within the ſeveral Governments in thoſe Countries. In *Sweden*, Gold is loweſt in Proportion to Silver, and this hath made that Kingdom, which formerly was content with Copper Money, abound of late with Silver, ſent thither (I ſuſpect) for Naval Stores.

In the End of K. WILLIAM's Reign, and the firſt Year of the late QUEEN, when Foreign Coins abounded in *England*, I cauſed a great many of them to be aſſayed in the Mint, and found by the Aſſays, that fine Gold was to fine Silver in *Spain*, *Portugal*, *France*, *Holland*, *Italy*, *Germany* and the Northern Kingdoms, in the Proportion above mentioned, Errors of the Mints excepted.

In *China* and *Japan*, one Pound Weight of fine Gold is worth but 9 or 10 Pounds Weight of fine Silver, and in *Eaſt-India* it may be worth 12. And this low Price of Gold in Proportion to Silver, carries away the Silver from all *Europe*.

So then, by the Courſe of Trade and Exchange, between Nation and Nation in all *Europe*, fine Gold is to fine Silver as 14⅘, or 15 to 1; and a Guinea at the ſame Rate is worth between 20*s.* 5*d.* and 20*s.* 8½*d*, except in extraordinary Caſes, as when a *Plate-Fleet* is juſt arrived in *Spain*, or Ships are lading here for the *Eaſt-Indies*, which Caſes I do not here conſider. And it appears by Experience as well as by Reaſon, that Silver flows from thoſe Places, where its Value is loweſt in Proportion to Gold, as from *Spain* to all *Europe*, and from all *Europe* to the *Eaſt-Indies*, *China* and *Japan*; and that Gold is moſt plentiful in thoſe Places, in which its Value is higheſt in Proportion to Silver, as in *Spain* and *England*.

It is the Demand for Exportation which hath raiſed the Price of exportable Silver about 2*d.* or 3*d.* in the Ounce above that of Silver in Coin, and hath thereby created a Temptation to export or melt down the Silver Coin, rather than give 2 *d.* or 3 *d.* more for Foreign Silver; and the Demand for Exportation ariſes from the higher Price of Silver in other Places than in *England*, in Proportion to Gold, that is, from the higher Price of Gold in *England* than in other Places, in Proportion to Silver, and therefore may be diminiſhed by lowering the Value of Gold in Proportion to Silver. If Gold in *England*, or Silver in *Eaſt-India*, could be brought down ſo low as to bear the ſame Proportion to one another in both Places, there would be here no greater Demand for Silver than for Gold to be exported to *India*: And if Gold were lowered only ſo as to have the ſame Proportion to the Silver Money in *England*, which it hath to Silver in the reſt of *Europe*, there would be no Temptation to export Silver rather than Gold to any other Part of *Europe*. And to compaſs this laſt, there ſeems nothing more requiſite, than to take off about 10*d.* or 12*d.* from the Guinea, ſo that Gold may bear the ſame Proportion to the Silver Money in *England*, which it ought to do by the Courſe of Trade and Exchange in *Europe*; but if only 6*d.* were taken off at preſent, it would diminiſh the Temptation to export or melt down the Silver Coin, and by the Effects, would ſhew hereafter better than can appear at preſent, what further Reduction would be moſt convenient for the Publick.

In the laſt Year of K. WILLIAM, the *Dollars* of *Scotland*, worth about 4*s.* 6½*d.* were put away in the North of *England* for 5*s.* and at this Price began to flow in upon us; I gave Notice thereof to the *Lords Commiſſioners of the Treaſury*, and they Ordered the *Collectors of Taxes* to forbear taking them, and thereby put a Stop to the Miſchief.

At the ſame Time the *Lewidors* of *France*, which were worth but 17*s.* and

3 Farthings a Piece, paſs'd in *England* for 17 *s.* 6 *d.* I gave Notice thereof to the *Lords Commiſſioners of the Treaſury*, and his late Majeſty put out a Proclamation, that they ſhould go but at 17 *s.* and thereupon they came to the Mint, and 1400000 *l.* were coined out of them; and if the Advantage of 5 *d.* 1 Farthing a *Lewidor* ſufficed at that Time to bring into *England* ſo great a Quantity, of *French* Money, and the Advantage of 3 Farthings in a *Lewidor* to bring it to the Mint, the Advantage of 9½ *d.* in a Guinea, or above, may have been ſufficient to bring the great Quantity of Gold which hath been coined in theſe laſt 15 Years without any Foreign Silver.

Some Years ago the *Portugal* Moydores were received in the Weſt of *England* at 28 *s.* a Piece; upon Notice from the Mint, that they were worth only about 27 *s.* 7 *d.* *the Lords Commiſſioners of the Treaſury* ordered *their Receivers of Taxes* to take them at no more than 27 *s.* 6 *d.*

6 *d*. Afterwards many Gentlemen in the Weſt ſent up to the Treaſury a Petition, that the Receivers might take them again at 28 *s*. and promiſed to get Returns for this Money at that Rate, alledging, that when they went at 28 *s*. their Country was full of Gold, which they wanted very much. But the *Commiſſioners of the Treaſury* conſidering that at 28 *s*. the Nation would loſe 5 *d*. a Piece, rejected the Petition. And if an Advantage to the Merchant of 5 *d*. in 28 *s*. did pour that Money in upon us, much more hath an Advantage to the Merchant of 9½ *d*. in a Guinea, or above, been able to bring into the Mint great Quantities of Gold without any Foreign Silver, and may be able to do ſtill, 'till the Cauſe be removed.

If Things be let alone 'till Silver Money be a little ſcarcer, the Gold will fall of it ſelf; for People are already backward to give Silver for Gold, and will, in a little Time, refuſe to make

Payments in Silver without a Premium, as they do in *Spain*; and this Premium will be an Abatement in the Value of the Gold: And ſo the Queſtion is, Whether Gold ſhall be lowered by the Government, or let alone 'till it falls of it ſelf, by the Want of Silver Money?

It may be ſaid, That there are great Quantities of Silver in Plate, and if the Plate were coined, there would be no Want of Silver Money: But I reckon that Silver is ſafer from Exportation in the Form of Plate than in the Form of Money, becauſe of the greater Value of the Silver and Faſhion together; and therefore I am not for coining the Plate till the Temptation to export the Silver Money (which is a Profit of 2 *d.* or 3 *d.* an Ounce) be diminiſhed: For as often as Men are neceſſitated to ſend away Money for anſwering Debts Abroad, there will be a Temptation to ſend away Silver rather than Gold, becauſe of the Profit, which is almoſt 4 *per Cent*. And for the ſame Reaſon Foreigners will chooſe to ſend hither their Gold rather than their Silver.

All which is moſt
Humbly ſubmitted to
Your Lordſhips great Wiſdom,

Mint-Office, Sept.
21. 1717.

ISAAC NEWTON.

TABLE I.

Carat Grains	In Decimal Parts of a Carat	Common Grains.	In Decimal Parts of a Penny Weight
0¼	0.0625	1	0.041666
0½	0.1250	2	0.083333
0¾	0.1875	3	0.125000
1	0.2500	4	0.166666
1¼	0.3125	5	0.208333
1½	0.3750	6	0.250000
1¾	0.4375	7	0.291666
2	0.5000	8	0.333333
2¼	0.5625	9	0.375000
2½	0.6250	10	0.416666
2¾	0.6875	11	0.458333
3	0.7500	12	0.500000
3¼	0.8125	13	0.541666
3½	0.8750	14	0.583333
3¾	0.9375	15	0.625000
4	1.0000	16	0.666666
		17	0.708333
		18	0.750000
		19	0.791666
		20	0.833333
		21	0.875000
		22	0.916666
		23	0.958333
		24	1.000000

TABLE II.

GOLD.

Better than Standard, in Car. Gr.	Fine Gold in a Pound Troy, in Car. Dec. Parts.	Specifick Gravity; that of Water being 1.	Worſe than Standard, in Car. Gr.	Fine Gold in a Pound Troy, in Car. Dec. Parts.	Specifick Gravity; that of Water being 1.
2 0	24.0000	19.6246	0 0¼	21.9375	17.7484
1 3¾	23.9375	19.5619	0 0½	21.8750	17.6971
1 3½	23.8750	19.4997	0 0¾	21.8125	17.6462
1 3¼	23.8125	19.4378	0 1	21.7500	17.5955
1 3	23.7500	19.3763	0 1¼	21.6875	17.5451
1 2¾	23.6875	19.3152	0 1½	21.6250	17.4950
1 2½	23.6250	19.2545	0 1¾	21.5625	17.4451
1 2¼	23.5625	19.1942	0 2	21.5000	17.3956
1 2	23.5000	19.1342	0 2¼	21.4375	17.3464
1 1¾	23.4375	19.0746	0 2½	21.3750	17.2974
1 1½	23.3750	19.0155	0 2¾	21.3125	17.2487
1 1¼	23.3125	18.9566	0 3	21.2500	17.2003
1 1	23.2500	18.8981	0 3¼	21.1875	17.1521
1 0¾	23.1875	18.8400	0 3½	21.1250	17.1042
1 0½	23.1250	18.7823	0 3¾	21.0625	17.0566
1 0¼	23.0625	18.7249	1 0	21.0000	17.0092
1 0	23.0000	18.6678	1 0¼	20.9375	16.9621
0 3¾	22.9375	18.6111	1 0½	20.8750	16.9153
0 3½	22.8750	18.5547	1 0¾	20.8125	16.8683
0 3¼	22.8125	18.4986	1 1	20.7500	16.8224
0 3	22.7500	18.4430	1 1¼	20.6875	16.7764
0 2¾	22.6875	18.3877	1 1½	20.6250	16.7307
0 2½	22.6250	18.3327	1 1¾	20.5625	16.6850
0 2¼	22.5625	18.2779	1 2	20.5000	16.6397
0 2	22.5000	18.2236	1 2¼	20.4375	16.5946
0 1¾	22.4375	18.1695	1 2½	20.3750	16.5498
0 1½	22.3750	18.1158	1 2¾	20.3125	16.5052
0 1¼	22.3125	18.0624	1 3	20.2500	16.4608
0 1	22.2500	18.0093	1 3¼	20.1875	16.4167
0 0¾	22.1875	17.9565	1 3½	20.1250	16.3728
0 0½	22.1250	17.9040	1 3¾	20.0625	16.3292
0 0¼	22.0625	17.8518	2 0	20.0000	16.2858
St^{d} 0 0	22.0000	17.8000			

TABLE III.

SILVER.

Better or worſe than Standard, in Pwts.	Fine Silver in a Pound Troy, in Pwts.	Specifick Gravity; that of Water, being 1.	Worſe than Standard in Pwts.	Fine Silver in a Pound Troy, in Pwts.	Specifick Gravity; that of Water, being 1.
B 18	240	10.5222	17	205	10.2302
17	239	10.5100	18	204	10.2221
16	238	10.5050	19	203	10.2140
15	237	10.4960	20	202	10.2099
14	236	10.4879	21	201	10.1979
13	235	10.4790	22	200	10.1898
12	234	10.4709	23	199	10.1818
11	233	10.4624	24	198	10.1738
10	232	10.4540	25	197	10.1658
9	231	10.4455	26	196	10.1577
8	230	10.4370	27	195	10.1497
7	229	10.4287	28	194	10.1418
6	228	10.4202	29	193	10.1338
5	227	10.4118	30	192	10.1258
4	226	10.4034	31	191	10.1179
3	225	10.3950	32	190	10.1100
2	224	10.3867	33	189	10.1021
1	223	10.3783	34	188	10.0942
St^d^. 0	222	10.3700	35	187	10.0863
W 1	221	10.3617	36	186	10.0784
2	220	10.3533	37	185	10.0706
3	219	10.3450	38	184	10.0627
4	218	10.3368	39	183	10.0548
5	217	10.3285	40	182	10.0470
6	216	10.3202	41	181	10.0392
7	215	10.3120	42	180	10.0314
8	214	10.3037	43	179	10.0236
9	213	10.2955	44	178	10.0158
10	212	10.2873	45	177	10.0080
11	211	10.2791	46	176	10.0003
12	210	10.2709	47	175	9.9926
13	209	10.2628	48	174	9.9848
14	208	10.2546	49	173	9.9771
15	207	10.2465	50	172	9.9694
16	206	10.2383	51	171	9.9617

TABLE IV.

	GUINEAS.					
	Q. Ann.		K. George Iſt.		K. George IId.	
Nr.	Weight in Grains.	Specifick Gravity.	Weight in Grains.	Specifick Gravity.	Weight in Grains.	Specifick Gravity.
1	128.05	17.907	128.14	17.946	129.32	17.690
2	127.85	17.658	128.20	17.905	129.00	17.793
3	127.80	17.651	129.04	17.897	128.29	17.993
4	128.36	17.903	127.82	17.851	129.57	17.604
5	128.64	17.916	119.23	17.769	129.78	17.767
6	127.79	17.650	129.74	17.796	129.93	17.799
7	127.89	17.861	127.93	17.792	129.28	17.734
8	128.24	17.964	127.69	17.922	128.03	17.684
9	128.55	17.847	129.31	18.175	128.74	17.708
10	128.35	18.007	129.12	17.663	128.08	17.963
11	127.66	17.632	127.46	17.678	128.68	17.700
12	128.21	17.733	128.52	17.874	128.35	17.672
13	127.22	17.841	128.16	17.800	128.91	17.770
14	128.07	17.987	127.35	17.761	129.16	17.766
15	127.05	17.730	124.16	17.737	129.19	17.845
16	123.64	17.771	128.29	17.841	129.25	17.706
17	128.86	17.809	128.05	17.710	128.78	17.808
18	127.54	17.804	127.23	17.794	128.35	17.777
19	127.90	17.863	128.65	17.769	129.04	17.701
20	128.47	17.818	127.36	17.812	128.27	17.693
Mean	127.80	17.8167	127.57	17.8246	128.90	17.7586

TABLE V.

FOREIGN GOLD COINS.

	Old Spanish		Portugal.			
	Piſtoles.		Half Moydores.		20 Shilling Pieces.	
Nr.	Weight in Grains.	Specifick Gravity.	Weight in Grains.	Specifick Gravity.	Weight in Grains.	Specifick Gravity.
1	103.12	17.9965	82.63	17.6773	110.54	17.6109
2	103.64	17.9440	83.01	17.3298	110.43	17.4180
3	104.13	17.8917	84.10	17.2690	110.45	17.6382
4	102.15	18.3064	83.15	17.4895	110.15	17.6805
5	102.63	18.0369	82.54	17.8272	110.12	17.3144
6	102.33	18.5179	82.47	17.6974	109.92	17.3924
7	103.22	18.0920	82.35	17.7861	110.23	17.6934
8	101.04	17.9148	82.83	17.7746	110.11	17.5630
9	104.54	18.0865	80.93	18.1051	110.71	17.6856
10	104.21	18.1533	83.70	17.5840	109.90	17.3892
11	102.27	17.8170	80.66	18.1258	110.01	17.4896
12	103.62	17.8643	82.33	17.5919	109.82	17.3923
13	104.41	18.2679	82.44	17.7672	110.07	17.5670
14	103.72	18.0527	82.44	17.8441	110.62	17.7275
15	102.59	18.1254	81.09	17.6666	110.22	17.6352
16	102.10	18.3435	82.45	17.8848	110.23	17.4139
17	103.21	17.6528	83.24	17.4237	109.95	17.5355
18	102.13	17.9175	82.72	17.6752	110.39	17.6060
19	102.75	17.3773	82.73	18.1028	110.62	17.7333
20	104.11	18.1376	82.52	17.7462	110.54	17.5739
Mean	103.09	18.0298	82.51	17.7184	110.26	17.5529

TABLE VI.

FOREIGN GOLD COINS.

French Pistoles of

Nr.	Lewis the XIV.		Lewis the XV.	
	Weight in Grains.	Specifick Gravity.	Weight in Grains.	Specifick Gravity.
1	102.76	17.9024	99.79	17.8196
2	101.26	17.6104	99.34	17.6134
3	103.16	17.7862	99.52	17.5520
4	103.15	17.7844	100.10	17.4729
5	102.08	17.8132	99.18	17.5539
6	102.23	17.5955	100.12	17.5035
7	101.85	17.8371	100.01	17.6696
8	101.55	17.5868	99.68	17.5936
9	102.24	17.6276	99.47	17.5123
10	101.68	17.6225	99.35	17.5530
11	102.90	17.7108	99.36	17.5547
12	101.03	17.7245	99.71	17.5855
13	102.55	17.5599	99.29	17.6809
14	100.90	17.7158	99.57	17.7486
15	102.70	17.6764	99.51	17.7064
16	102.65	17.6392	99.53	17.6607
17	101.48	17.7410	99.85	17.8443
18	101.72	17.6291	100.02	17.5782
19	102.17	17.5852	99.67	17.6856
20	103.22	17.6280	99.85	17.6722
Mean	102.16	17.5529	99.64	17.6280

SHILLINGS.

Nr.	Q. Ann.		K. George the Ist.				K. George the IId.	
			Unworn.		Worn.		Unworn.	
	Weight in Grains.	Specifick Gravity.	Weight in Grains.	Specifick Gravity.	Weight in Grains.	Specifick Gravity.	Weight in Grains.	Specifick Gravity.
1	88.40	10.4122	92.70	10.3229	90.53	10.3227	92.22	10.2580
2	88.96	10.3801	92.92	10.4170	89.80	10.2981	93.30	10.3555
3	89.33	10.3033	92.87	10.3881	89.60	10.2988	93.09	10.2860
4	88.34	10.3930	93.20	10.4250	91.19	10.2230	93.24	10.2574
5	86.84	10.3876	93.23	10.4284	91.28	10.1876	92.88	10.3314
6	86.90	10.3699	92.20	10.4416	89.33	10.3511	93.51	10.3097
7	88.11	10.3780	91.97	10.3337	91.15	10.2994	92.90	10.3337
8	88.11	10.4017	93.30	10.3897	90.05	10.3505	92.88	10.2290
9	89.09	10.3834	93.00	10.4027	90.68	10.3524	93.19	10.3096
10	85.99	10.4230	93.50	10.3889	90.28	10.3413	92.82	10.2677
11	90.43	10.3585	93.04	10.3608	92.77	10.3885	92.34	10.2464
12	90.42	10.3110	91.67	10.3115	90.72	10.2508	93.20	10.2417
13	88.30	10.3517	93.14	10.3488	91.25	10.3219	92.80	10.3456
14	92.12	10.3389	93.01	10.2660	88.33	10.3917	92.81	10.3237
15	84.78	10.3013	92.88	10.3660	90.52	10.3215	93.41	10.3215
16	91.79	10.4425	92.26	10.3546	90.52	10.2980	92.59	10.2536
17	88.92	10.4611	92.40	10.3125	90.08	10.3066	92.88	10.3421
Mean	88.75	10.3763	92.78	10.3681	90.47	10.3126	92.94	10.2948

ASSAY WEIGHTS.

GOLD.				SILVER.		
Fine in Ounces.	Fine in Carats.	Fine in Car. Gr.	Aſſay in Troy Grains.	Fine in Ounces.	Fine in Penny Weights.	Aſſay in Troy Grains.
St^{d}. 11	22	0.00	8.250	St^{d}. 11.1	222.00	16.650
6	12	0.00	4.500	6	120.00	9.000
4	8	0.00	3.000	4	80.00	6.000
2	4	0.00	1.500	2	40.00	3.000
1	2	0.00	0.750	1	20.00	1.500
$0\frac{1}{2}$	1	0.00	0.375	$0\frac{1}{2}$	10.00	0.750
$0\frac{1}{4}$	0	2.00	0.188	$0\frac{1}{4}$	5.00	0.375
$0\frac{1}{8}$	0	1.00	0.094	$0\frac{1}{5}$	4.00	0.300
$0\frac{1}{16}$	0	0.50	0.047	$0\frac{1}{10}$	2.00	0.150
$0\frac{1}{32}$	0	0.25	0.023	$0\frac{1}{20}$	1.00	0.075
				$0\frac{1}{40}$	0.50	0.037

Price of an Ounce of Silver,				Price of a Guinea in Shillings.		Price of an Ounce of Standard Gold in				Fine Gold to fine Silver.
in Coin.		in Bullion.				England.		Ireland.		
s.	d	s.	d.	s.	d.	s.	d.	s.	d.	℔.
5	2	5	5	20	0¼	74	3	80	5¼	14.5076
5	2	5	4½	20	2¼	74	10¼	81	1	14.6206
5	2	5	4	20	4	75	5¼	81	8¾	14.7326
5	2	5	3½	20	6	76	0¼	82	4½	14.8503
5	2	5	3	20	8	76	7½	83	0¼	14.9681
5	2	5	2½	20	10	77	3	83	9¼	15.0879
5	2	5	2	21	0	77	10½	84	4¼	15.2096

The *Firſt* Column of this *Table* contains the Price, in Shillings and Pence, of an Ounce Troy of Silver of the *Engliſh Standard.* For a Troy Pound of Silver, 11 Ounces 2 Penny Weight fine, and 18 Penny Weight *Allay*, is cut at the Mint into 62 Shillings; the 12th Part of which, or an Ounce, is 5*s.* 2*d.* So that an Ounce of Silver in Coin, before it has loſt any Part of its Weight by wearing, is worth 5*s.* 2*d. per* Ounce. But Silver of the ſame *Standard* ſells at Market, in *Bullion*, at 5*s.* 5*d. per* Ounce. This is the Price of uncoined Silver of the *Engliſh Standard*, and has been ſo for ſome Time. The Price of uncoined Silver of *Standard Allay* is above 96 *s.* more in one hundred Pounds, that is near 5 *per Cent.* more, than it is in Coin. This high Price of uncoined Silver above that of Silver in Coin, the *Allay* being the ſame, creates a ſtrong Temptation to melt down the Silver Coin before it has loſt any Part of its Weight by wearing. This Temptation to melt down new coined Silver will occaſion both a Scarcity of Silver Coins, and a great Loſs of Value in thoſe which remain, by wearing.

The *Second* Column contains different Prices of *Standard* Silver, in Bars.

The *Third* Column contains the true Prices of a Guinea in Shillings and Pence, deduced from conſidering the Market Price of Silver of *Standard Allay* with its Price in Coin. For if the Market Price of uncoined Silver of *Standard Allay*, exceeds its Price in

Coin, that is, if an Ounce of uncoined Silver of *Standard Allay* ſells for more than 5*s.* 2*d*, it argues that the legal Value of the Guinea is too high, and that it ought to be lowered in Proportion to the Price of Silver in *Coin* to its Price in *Bullion*. At preſent, the *Legal* Value of the Guinea in *England* is 21*s*, and the Price of Silver in *Coin* to its Price in *Bullion* as 62 to 65; and therefore 21 muſt be leſſened in the Ratio of 62 to 65, or 21 muſt be multiplied by 62, and the Product divided by 65, which will give 20.03077=20*s.* $\frac{1}{4}$*d.* nearly, for the true Value of the Guinea at preſent in *England*.

The *Fourth* and *Fifth* Columns contain the Prices in Shillings and Pence of an Ounce of Gold of the *Engliſh Standard* in *England* and *Ireland*.* And the laſt Column contains the Proportions of fine Gold to fine Silver, according to the ſeveral Prices of *Standard Bullion* ſet down in the ſecond Column, and the Prices of the Guinea ſet down in the Third.

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* The Explanation of the laſt Column, being omitted in the AUTHOR's Copy, is added by the Editor.

Theorems for finding the Value v, in *Engliſh* and *Iriſh* Shillings and Pence, of any Weight of Gold or Silver denoted by w in Grains, when the Differences of Fineneſs from the *Engliſh Standard*, expreſſed in Carats and Carat Grains for Gold and Penny Weights for Silver, denoted by + or — d (and conſequently the true Fineneſs expreſſed by 22 ± d for Gold, and 222 ± d for Silver) are known.

Gold.

Theorem I. $v = \frac{w \times \overline{22 \pm d}}{135.6019}$ s. *Engliſh.*

II. $v = \frac{w \times \overline{22 \pm d}}{125.171}$ s. *Iriſh.*

III. 1 oz. $v = \frac{22 \pm d}{.282504}$ s. *Engliſh.*

IV. 1 oz. $v = \frac{22 \pm d}{.260773}$ s. *Iriſh.*

* Silver.

SILVER.

THEOREM I. $v = \frac{w \times \overline{222 \pm d}}{1718.709}$ p. *Engliſh.*

II. $v = \frac{w \times \overline{222 \pm d}}{1586.501}$ p. *Iriſh.*

III. 1 oz. $v = \frac{222 \pm d}{3.58}$ p. *Engliſh.*

IV. 1 oz. $v = \frac{222 \pm d}{3.305}$ p. *Iriſh.*

The above THEOREMS for Gold and Silver are juſt Meaſures of their Values, the Guinea being rated at preſent at 21ſ. *Engliſh*. And the following THEOREMS are juſt Meaſures of the Value of Gold if the Guinea was reduced to 20 Shillings *Engliſh*, which is its true Value *.

GOLD.

THEOREM I. $v = \frac{w \times \overline{22 \pm d}}{142.382}$ s. *Engliſh.*

II. $v = \frac{w \times \overline{22 \pm d}}{131.4295}$ s. *Iriſh.*

III. 1 oz. $v = \frac{22 \pm d}{.2966292}$ s. *Engliſh.*

IV. 1 oz. $v = \frac{22 \pm d}{.2738269}$ s. *Iriſh.*

* The GUINEA was firſt coined, in the 15th Year of K. CHARLES II. for 20 Shillings. And, although it ſoon afterwards paſſed at an higher Value; and, during the Confuſion of the *Clipped Money*, roſe firſt to 25 Shillings and then to 30 Shillings; from which Rate, ſoon after the *Recoinage* of the Silver, it ſettled at 21 Shillings and 6 Pence; yet there was no *Authority* for this Currency: And the *Legal* Value of the GUINEA in *England* was no more than 20 Shillings, until the PROCLAMATION of his late Majeſty K. GEORGE I, on the 22d of *December* 1717, which made it current at 21 Shillings.

As in theſe THEOREMS, mention is made of *Iriſh* Value, It may not be improper here, to obſerve that the *Legal* or *Extrinſic* Value of Money, is higher in *Ireland* than in *England*.

Before the Reign of K. EDWARD IV, the *Legal* Values of Money in *England* and *Ireland* were equal. But in that Reign, a Difference was introduced; which then and afterwards, was uſually (for I ſpeak not of *baſe* Money) a fourth Part; the *Iriſh* Shilling being worth but 9 Pence in *England*, and the ENGLISH SHILLING paſſing in *Ireland* for 16 Pence: So that 100 Pounds *Engliſh* made 133 Pounds 6 Shillings and 8 Pence in *Ireland*; or, in other Words, 33 Pounds 6 Shillings and 8 Pence *per Cent.* made EXCHANGE at a PAR between the two Countries. This Difference of the Values of *Engliſh* and *Iriſh* Money continued until the Year 1637, when it was taken away; and all Payments on Account of Crown-

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Rents, Leaſes, and other Charges and Contracts, *at that Time ſubſiſting*, were, by a Deduction of the fourth Part, reduced into *Engliſh* Value. Hence, the *Legal* Value of Money became again the ſame in *England* and *Ireland*: And ſo it continued, as to *Engliſh Money*, after the RESTORATION, during the Reign of K. CHARLES II. K. JAMES II. upon coming into *Ireland*, after his *Abdication*, publiſhed a PROCLAMATION, on the 25th of *March* 1689, to raiſe the ENGLISH SHILLING in *Ireland* to 13 Pence. About the Year 1695 (but it does not now appear, whether by any Authority, or only by a voluntary Currency; though probably, it was by a PROCLAMATION,) it roſe to 14 Pence: From which Rate it was reduced to 13 Pence, in the Year 1701; and at that Value it hath continued ever ſince in *Ireland*.

The *Legal* Value of the GUINEA, at firſt, was no more in *Ireland* than in *England*: And Probably, it roſe, in voluntary Currency, in both Kingdoms alike; until K. JAMES II, by his PROCLAMATION of the 25th of *March* 1689, raiſed it in *Ireland* to 24 Shillings; from which Rate it was, before the End of the Year 1692, reduced to 23 Shillings: But afterwards, about 1695, it roſe to 26 Shillings; though by what Authority either of theſe Alterations were made, does not now appear. Probably there was a PROCLAMATION for the Purpoſe. From 26 Shillings it was lowered by PROCLAMATION, on the 7th of *June* 1701, to 23 Shillings; its Currency in *England* being then 21 Shillings and 6 Pence. When it was fixed in *England* at 21 Shillings, if it had been proportionably lowered in *Ireland*, great Part of the Diſtreſs occaſioned by a confuſed and perplexed State of the Coin, would have been avoided. But this was not then foreſeen, or not attended to, and the *Legal* Value of the GUINEA in *Ireland* was ſuffered to remain at 23 Shillings, until the PROCLAMATION of September 1737.

In *Ireland*, before the RESTORATION of K. CHARLES II, and from that Time until about the Year 1739 or 1740, a very great Part of the circulating *Caſh* conſiſted of the Coins of *Foreign* Nations made Current, from Time to Time, by PROCLAMATION. Miſtaken Notions of Advantages to be gained by raiſing the *Denomination* of Coin above its true Value, and the Want of Accuracy and competent Skill, for determining ſuch Value, and preſerving the juſt Proportion between Gold and Silver; kept the circulating *Caſh* of *Ireland* in a State of very great Confuſion and Perplexity, for many Years: Sometimes Gold being over-rated with Reſpect to Silver, and at other Times, Silver with Reſpect to Gold; and the ſeveral *Species* of both being very inaccurately rated with Reſpect to one another. This Confuſion maintained a Traffick much to the Detriment of the Nation, though largely to the private Benefit of the *Merchant* and *Exchanger*: And the Evil was grown to that Heighth, that juſt before the PROCLAMATION of 1737, ſcarcely any Silver Coins were ſtirring, and the ſeveral *Species* of Gold Coin, whereof the current *Caſh* then conſiſted, were according to the beſt

Computations, in the following Proportions, *viz.*

Portugal	4 *L.* Pieces,	40
	2 *L.* Pieces,	30
	1 *L.* Pieces,	1
	Moydores,	30
Spaniſh Piſtoles and *French* Louis d'Ores,		1
GUINEAS,		5.

To remedy this Evil, many Expedients had, in its Progreſs, been ſuggeſted by private Men; and among others, that of erecting a MINT in *Ireland!* But a more prudent, and, in all Reſpects, a better Method was choſen; and the PROCLAMATION of 1737 regulated the Currency of the Gold Coins, by reducing them to their Values according to the *Iriſh* Currency of the ENGLISH SHILLING: ſo that a GUINEA was to paſs at 22 Shillings and 9 Pence, and the other *Species* were fixed in the ſame Proportion; ſave that the large Pieces were ſet a little below their Value, and the ſmall ones fixed a little above it: Which was done, in order to get rid of the former, and to incourage the bringing in the latter for *Change*, the Want whereof was a very preſſing Diſtreſs on the *Manufactures*, eſpecially on that of the LINNEN. The *Foreign* Silver Coins, were left to remain on the former PROCLAMATIONS then in Force; whereby, for the greateſt Part, they were under-rated, and therefore moſt of them had been carried out of the Country: And the Variety in thoſe Coins, and frequent Alterations of their ALLAYS, made it adviſeable to give no Encouragement to the Re-importation or Currency of them. For which

Reaſons, only the Gold Coins were then regulated. And as this REGULATION was made by the *Legal* Value of the ENGLISH SHILLING, which is higher in *Ireland* than in *England* in the Proportion of 13 to 12; of Conſequence, the *Legal* or *Extrinſic* Value of Money is fixed and ſettled higher in that Proportion in *Ireland* than in *England.* So that 100 Pounds *Engliſh* is 108 Pounds 6 Shillings and 8 Pence in *Ireland*; or, in other Words, 8 Pounds 6 Shillings and 8 Pence *per Cent*, now makes the PAR of EXCHANGE between the two Countries. And this is the Difference in Money, eſtabliſhed by Law, between *Engliſh* and *Iriſh* Value.

This important, uſeful, and indeed neceſſary REGULATION, was ſome Time afterwards followed by an Importation of light and diminiſhed GUINEAS; and poſſibly the REGULATION, in ſome of its Conſequences, might have furniſhed one Temptation, among others, to theſe wicked Practices. But the Evil was put a Stop to by *Weighing*, as is before mentioned; and the Coin of *England* now conſtitutes the greateſt Part of the *Caſh* circulating in *Ireland*, ſo that the *Species* of Money current in the two Countries is, in general, the ſame. A Circumſtance always to be deſired in Places, ſo nearly connected, under the ſame Government! And a Circumſtance to be yet farther improved, by making the *Legal* or *Extrinſic* Value of Money, again the ſame in both Nations.

APPENDIX.*

I Shall determine the Meaſure of EXCHANGE, or of the *Price* of a Bill purchaſed from a Merchant or Banker, according to the *Legal* Value of a given Quantity of Money in the Place where the Bill is purchaſed; to diſcharge a Debt in a diſtant Place, according to the *Legal* Value of the ſame Quantity of Money in the Place where the Debt is to be paid.

PROPOSITION.

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* THIS and the following PROPOSITION about EXCHANGE, were Part of Copies of the foregoing ESSAY, made by the AUTHOR about the Years 1738 or 1739. The reſt of thoſe copies he deſtroyed: but theſe Papers being found in a Parcel with ſome others, under a Direction that they ſhould be looked over before they were burned; it hath, upon peruſal of them, been thought proper to publiſh them, in this Manner, by Way of APPENDIX.

PROPOSITION.

If B *and* D *be put for the* Legal *Values of a given Quantity of Money in the Places where the Bill is drawn and Debt is to be paid,* b *for the* EXCHANGE *or Price of the Bill according to the* Legal *Value of a given Quantity of Money expreſſed by* B, d *for the Debt to be paid according to the* Legal *Value of the ſame Quantity of Money expreſſed by* D, *and* Δ *for the Demand for Bills on the Place where the Debt is to be paid; I ſay that* $b = \frac{Bd}{D} + \Delta$.

For ſetting aſide all Demand for Bills on the Place where the Debt is to be paid, the *Price* of the Bill muſt bear the ſame Proportion to the Debt to be diſcharged by it, as the *Legal* Value of a given Quantity of Money in the Place where the Bill is drawn bears to the *Legal* Value of the ſame Quantity in the Place where the Debt is to be paid, that is, b muſt be to d, as B is to D; and conſequently $b = \frac{B\,d}{D}$. But the Merchant or Banker ought to have a *Premium* for the Bill, for as much as he frees the Perſon who buys it from the Expence and Hazard of tranſmitting the Money in *Specie* to pay the Debt; and this *Premium* muſt be greater in Proportion to the Demand there is for Bills on the Place where the Debt is to be paid, that is, this *Premium* will be as Δ. And therefore to the foregoing Value of b, Δ muſt be added, and then univerſally, $b = \frac{B\,d}{D} + \Delta$.

Cor. 1. If the *Legal* Values of a given Quantity of Money, in the Places where the Bill is drawn and the Debt is to be paid, be equal, the Exchange or *Price* of the Bill, is equal to the Debt added to the *Premium* ariſing from the Demand for Bills on the Place where the Debt is to be paid. If B be equal to D, then will $b = d + \Delta$.

This COROLLARY obtains with regard to EXCHANGE in different Places of the ſame Country; for the *Legal* Value of a given Quantity of Money is commonly the ſame in all Parts of the ſame Country. If the EXCHANGE exceeds the Debt by 1 Pound in 100, then Δ will be $\frac{d}{100}$, for $100 : 1 :: d : \frac{d}{100}$; and b will be equal to $d + \frac{d}{100} = \frac{101\,d}{100} = 1.01\,d$. If d be 40 *l*, b will be 40 *l*. 8 *s*. If d be 175 *l*, b will be 176 *l*. 15 *s*.

COR. 2. If the *Legal* Value of a given Quantity of Money where the Bill is drawn, be to the *Legal* Value of the ſame Quantity of Money where the Debt by Virtue of that Bill is to be paid, as 13 to 12; then will the EXCHANGE or *Price* of the Bill according to the *Legal* Value of Money in the Place where it is drawn, exceed the Debt in the Place where it is due, in the Ratio of 13 to 12, added to the *Premium* due from the Demand of Bills for the Payment of Debts in the Place where the Debt is due. If B be to D, as 13 to 12, then will $b = \frac{13\,d}{12} + \Delta$. And if the Bill and Debt exchange Places, then will $b = \frac{12\,d}{13} + \Delta$.

The *Legal* Value of the ſame Quantity of Money, as to Weight and Fineneſs, is greater in *Ireland* than in *England*, in the Proportion of 13 to 12; conſequently, if a Debt of 100 Pounds due in *London* be to be paid by a Bill drawn by a Merchant or Banker in *Dublin* on his Correſpondent in *London*; the Exchange or *Price* of the Bill in *Dublin*, will be $\frac{13 \times 100}{12} + \Delta = 108$ *l.* 6 *s.* 8 *d.* $+ \Delta$; and if Δ, the *Premium* to the Banker or Merchant, be 18 *s.* 4 *d*, then will the Exchange, or b, $= 109\frac{1}{4}$ *l*, which has been the mean Exchange in *Dublin* for Bills drawn on *London*, ſince the late *Reduction* of the Gold in *Ireland*; for ſince that Time, EXCHANGE has been between 108¾ and 109¾, the mean of which is 109¼.

PROPOSITION.

If two Nations pay their Debts to each other by Bills of EXCHANGE; *if* A *denote the Nation in which a Bill of* EXCHANGE *is drawn by a Merchant or a Banker on his Correſpondent in another Nation, ordering him to pay a Debt in that other Nation; and if* B *denote the Nation in which the Debt is due and directed to be paid; if* W *and* F *denote the Weight and Fineneſs of one of the Gold or Silver Coins of the Nation* A, *and* N *the Number of either Sort which is juſt equal to the Debt; if* w *and* f *denote the Weight and Fineneſs of one of the Gold or Silver Coins of the Nation* B, *and* n *the Number of either Sort which is likewiſe juſt equal to the Debt; if* D *denote the Debt ex-*

preſſed in the Gold or Silver Coins of the Nation B; *if* L *denote the* Legal *Value of fine Gold or fine Silver in the Nation* A *in Proportion to its* Legal *Value in the Nation* B; *and* P *the Price of the Bill paid to the Merchant or Banker who draws it; I ſay, ſetting aſide the* Premium *to the Merchant or Banker who draws the Bill, and an extraordinary Demand for Bills for the Payment of Debts in the Nation* B, *that* P = W F N L = w f n = D.

The Debt is to be paid in the Coin of the Nation in which it is due, that is, in the Coin of the Nation B; and the Bill is purchaſed in the Coin of the Nation A. But the *Price* of the Bill in the Gold or Silver Coin of the Nation A, muſt be exactly equal to the Debt expreſſed in the Coins of the Nation B, that is, P muſt be exactly equal to w f n. If both Nations place the ſame *Legal* Value on fine Gold or fine Silver, in which caſe L will be a given Quantity, w f n will be exactly equal to W F N in the Nation A; but if the *Legal* Value of fine Gold or fine Silver be greater or leſſer in the Nation A than it is in B, that is, if L be greater or leſſer in A than it is in B, then muſt W F N be multiplied into L, to give a Sum of Money in the Coins of the Nation A which is juſt equal to the Debt expreſſed in the Coins of the Nation B, that is, W F N L is equal to w f n. And therefore, ſetting aſide the *Premium* to the Merchant or Banker who draws the Bill, and an extraordinary Demand for Bills for the Payment of Debts in the Nation B, $P = W F N L = w f n l = D L$ *.

COR. 1. If two Nations uſe the ſame Gold and Silver Coins in the Payment of their Debts to each other, but the *Legal* Values of thoſe Coins are different in the two Nations. If the ſame Coins be valued higher in the Nation in which the Bill is drawn than they are in the Nation in which the Debt is to be diſcharged, in the Proportion of 13 to 12, then will L be $\frac{13}{12}$, and $P = \frac{13\ D}{12}$. And if the ſame Coins be valued lower in the Nation in which the Bill is drawn than in the Nation in which the Debt is to be paid in the Proportion of 12 to 13, L will be $\frac{12}{13}$, and $P = \frac{12\ D}{13}$. The *Engliſh* Coins are valued higher in *Ireland* than in *England*, in the Proportion of 13 to 12, and conſequently lower in *England* than in *Ireland*, in the Proportion of 12 to 13. Whence, if a Bill be drawn in *Ireland* for the Payment of 100 Pounds in *England*, the *Price* of the Bill, excluſive of the *Premium* to the Banker and an extraordinary Demand for Bills to pay Debts in *England*, will be $\frac{13}{12} \times 100 = 108.3333$ &c. Pounds = 108*l.* 6*s.* 8*d.*; and if a Bill be drawn in *England* for the Payment of 100 Pounds in *Ireland*, P will be $\frac{12}{13} \times 100$ = 92 *l.* 6 *s.* 1¾ *d.* nearly.

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* The Copy is followed here exactly, but there ſeems to be a Miſtake, and from the ſtating the PROPOSITION, it ought to ſtand thus $P = W F N L = w f n = D$.

Since the late *Reduction* of the Gold in *Ireland*, the *Price* of a Bill in *Dublin*, for the Payment of 100 Pounds in *London*, has been between 108¾ and 109¾ Pounds, and at a Medium 109¼ Pounds. So that, at a Medium, 18 *s.* 4 *d.* is allowed the Banker as a *Premium* for drawing a Bill on *London*.

If r denote the Rate of EXCHANGE, that is 8¾, 9¾ and 9¼ in the foregoing Caſes, then will $P = \frac{\overline{100 + r} \times D}{100}$ when the Bill is drawn in *Dublin*, and $P = \frac{100\,D}{100 + r}$ when the Bill is drawn in *London*. For Example, if EXCHANGE in *Dublin* for Bills drawn on *London* be 9¼ *per Cent*, the *Price* of a Bill in *Dublin* for the Payment of 265 Pounds in *London*, will be 289 Pounds 10 Shillings and 3 Pence. And the *Price* of a Bill in *London* for the Payment of the ſame Sum in *Dublin*, when the Rate of EXCHANGE in *London* is 10 *per Cent*, will be 240 Pounds 18 Shillings $2\frac{8}{11}$ Pence. In the firſt Caſe $100 + r$ is 109.25, and in the Second 110; and D is 265 in both. When the Bill is drawn in *Dublin*, $P = \frac{109.25 \times 265}{100} = 289.5125$ Pounds = 289*l.* 10*ſ.* 3*d*; and when the Bill is drawn in *London*, $P = \frac{100 \times 265}{110}$ $= 240.90909$ Pounds = 240*l.* 18*ſ.* $2\frac{8}{11}$ *d.*

FINIS.